POST-CONVENTION ISSUE June, 1948

THE FOUNDRY

wherever metals are cast...

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OVER 40 YEARS OF SERVICE TO THE FOUNDRY INDUSTRY

MEMBER
MANUFACTURERS ASSOCIATION INC. FOUNDRY EQUIPMENT

OSBORN

MOULDING MACHINES CORE BLOWERS

THE OSBORN MANUFACTURING COMPANY 5401 Hamilton Avenue • Cleveland, Ohio

Bourbon Furnace, Bath County, Kentucky, in 1791. Men with guns and a blockhouse were needed to protect ore diggers against warlike Indians.

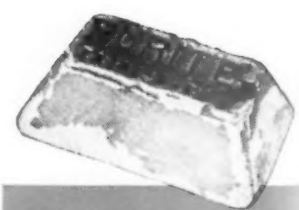
INTERLUDE IN IRON MAKING . . . 1791

Dangerous and discouraging was the castings business in 1791. Indians sniping from behind rocks and trees . . . bog iron containing phosphorus and other weakening elements—such were the troubles which make those of modern foundries seem trivial. Yet hostile savages and impure ores didn't stop the supply of early castings.

Indians nowadays are no foundry problem, but it is still vital to reduce impurities in cast iron—a job made simpler with PURITE.

In the forehearth, or teapot ladle, PURITE reduces sulfur, permitting close control over refining. In the cupola, PURITE improves combustion, expels occluded gases, reduces oxidation, prevents sulfur pick-up, and washes out non-metallic impurities. The resulting better mixture of cupola iron, coupled with the refining, insures a clean, quiet pouring metal of uniform analysis . . . makes for lower losses, increased strength and improved machinability in the finished casting.

Write for more information about PURITE—what it is and how to use it. Mathieson Chemical Corporation, 60 East 42nd Street, New York 17, N. Y.



PURITE is commercially pure soda ash containing over 98% sodium carbonate, fused and cast into convenient 2-lb. pigs. Its desulfurizing and refining action are traceable to the chemistry of soda ash.

Mathieson

PURITE

Purite (Fused Soda Ash) . . . Liquid Chlorine
Caustic Soda . . . Soda Ash . . . Bicarbonate of Soda . . . Ammonia, Anhydrous & Aqua
Sodium Chlorite Products . . . Chlorine Dioxide
HTH Products . . . Dry Ice . . . Carbonic Gas
Sodium Methylate

THEY'RE HARD

THEY'RE TOUGH

Omega for Shock-Resistance	
Normal working hardness	— Rockwell C, 58 to 60
Tensile strength	— 340,000 psi max.
Yield point	— 280,000 psi max.
Unnotched Charpy	— 130 foot pounds

Omega is a champion because it is a tool steel engineered for shock-resistance — combining hardness, toughness and ductility. There's no better steel for cold-battering jobs.

Omega chisels are ideal for pneumatic chippers, for they readily absorb impacting. They're good for hand chisels and core breakers, too. Cutting edges stay sharp; the shanks are non-peening.

Whether you buy finished chisels or make them up yourself, specify Omega for real chisel performance. Your nearest Bethlehem sales office or tool steel distributor can give you prompt delivery and service.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

Export distributor: Bethlehem Steel Export Corporation

★ BETHLEHEM STEEL ★

OMEGA . . . one of Bethlehem's Fine Tool Steels

The 1st bag, or the 1,000th bag.
100 LBS. NET
FEDERAL GREEN BOND
IS A 100% MINERAL SAND BOND OF PROVEN, PRACTICAL QUALITY USED IN ALL CLASSES OF FOUNDRY SAND IN GREY IRON, MALLEABLE AND STEEL FOUNDRY PRACTICE.
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Manufactured By
THE FEDERAL FOUNDRY SUPPLY CO.
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shows no variation in fine, dependable, uniform quality.

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JUNE, 1948

THE FOUNDRY

VOLUME 76—NUMBER 6

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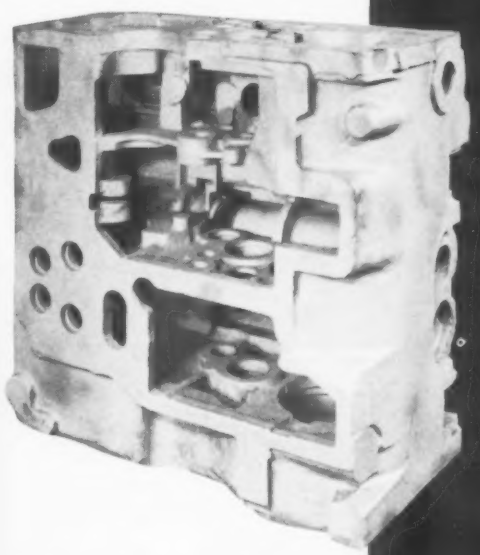
PREFERRED BY

Slicking the cope half of a diesel cylinder block core, with the dark, ram-up cores set in position.

Diesel Cylinder Block

PERFORMANCE

THE HANSELL-ELCOCK FOUNDRY COMPANY



Milling machine headstock; weight, 2,200 lbs. 74 cores in this casting were set to 1/32".

Whether it's a 2,200 lb. milling machine headstock . . . a 19,000 lb. pump shell . . . or a diesel cylinder block weighing just a few hundred pounds, the Hansell-Elcock Foundry can pour the job to closely controlled specifications. In this large, Mid-West jobbing shop—specializing in castings of "Controlled Specifications" for the machine tool, marine engine and diesel manufacturers—the attainment of these exacting specifications often hinges upon core oil performance.

For example: blueprints on the milling machine headstock, shown here, called for 74 cores set to 1/32" tolerance—and the slightest amount of core sagging, warping, blows, or crumbling meant a scrapped casting. LINOIL performed reliably on this job as on all other exacting core jobs in this jobbing foundry—where one oil is required to core-up everything that is cast.

Jobbing work affords little opportunity for gentle core handling—ram-up cores are baked twice, diesel cores are stacked like cord wood—and all cores withstand an average of 10 abusive handlings. Not only do LINOIL cores retain sharp dimensions, but—since switching to LINOIL—oil ratios have been cut from 9 to 6 qts. per batch—with no detriment to performance. Economy and dependability . . . under a variety of conditions . . . are the reasons the Hansell-Elcock Foundry prefers LINOIL.

THE LINOIL THE LOGICAL OIL

WERNER G. SMITH COMPANY

(DIVISION OF ARCHER-DANIELS-MIDLAND COMPANY)

2191 WEST 110th STREET • CLEVELAND 2, OHIO

New!

Pangborn ROTOBLAST "TABLE-ROOM" FOR ALL GENERAL-PURPOSE BLAST CLEANING

WITH this new ROTOBLAST* the jobbing foundry can clean castings as *thoroughly* and almost as *economically* as the specialty foundries.

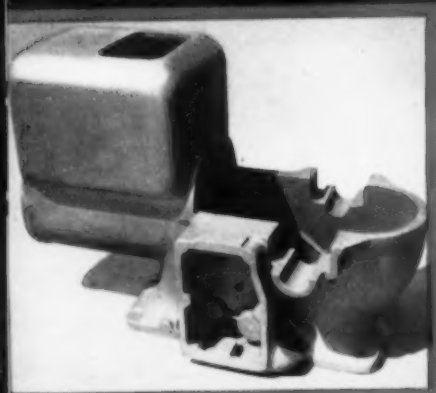
The jobbing foundry making a quantity of castings from different patterns has always been handicapped in the selection of a good single blast machine for all types of general-purpose blast cleaning work.

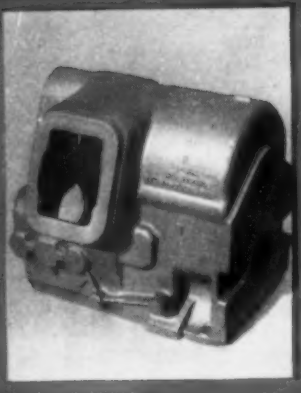
The Pangborn "Table-Room" will quickly clean castings weighing a few pounds and in any shape, to a casting weighing 5,000 pounds and up to five feet in length and thirty inches high.

The ROTOBLAST "Table-Room" is easy to operate. Put castings on table, close the doors, turn on the blast and within a few minutes the castings are cleaned down to virgin metal.

*Trademark of the Pangborn Corporation

CLEANING CASTINGS LIKE THESE IS A ROUTINE JOB FOR PANGBORN "TABLE-ROOM"





Some of the "TABLE-ROOM" advantages are:
No pit requirement for installation • Experienced operator not needed.
No compressed air, no helmets, no hose nor nozzles • 100% SAFE!

For complete information on this or any other Pangborn equipment to do your blast cleaning operations *faster, better, cheaper,* write to: PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Md.

More Than 25,000 Pangborn Machines Serving Industry

Pangborn

BLAST CLEANS CHEAPER with the right equipment for every job

Champion TO BETTER

A NEW MACHINE INTRODUCED *A NEW WAY* GIVES EVERY FOUNDRY AN OPPORTUNITY TO "CHAMPION-IZE" FOR HIGHER QUALITY AT LOWER COSTS.

IF you have been debating the question of installing core blowers, this message is intended especially for you. A new model Champion core blower, the "Junior", just announced to the industry, has the answers to your questions:

A CHAMPION BLOWS BETTER CORES FASTER, EASIER, AT LOWER COST!

From the giant CB-400 down to the CB-5 ("Junior"), the same advanced engineering features, precision construction and smooth operation of any Champion Core Blower give instantaneous action, uniform quality, with effortless ease.

By eliminating lost motion, spoilage and waste, by producing uniformly high quality product, and by making man-power more productive, Champion Core blowers have won a firm place in the foundry picture.

Take advantage now of the new introductory offer, to see what the "Champion Method" will do for you.

1. IS CORE BLOWING PRACTICAL FOR ME?

With the "Junior" machine, even the smallest foundry which produces duplicate castings will find it worthwhile to blow their cores.

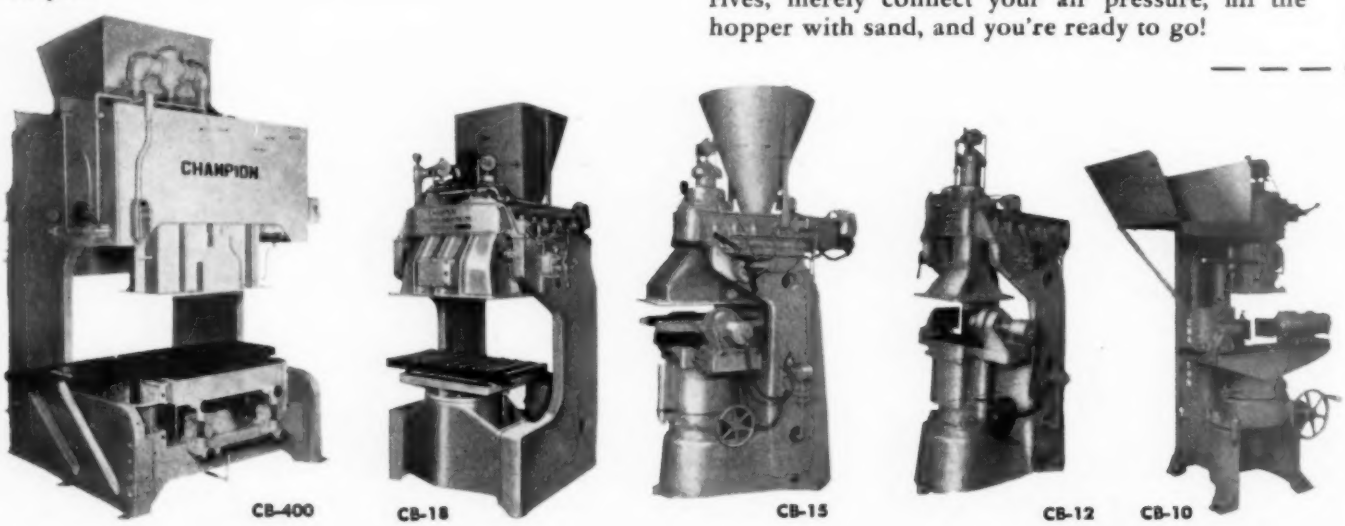
At a small investment, you have all the features of speed, uniformity and ease of handling that are characteristics of the largest model Champion.

2. HOW LONG DOES IT TAKE TO CHANGE OVER?

You'd be surprised! The introductory plan eliminates all red tape and unnecessary delay.

3. HOW DO I GO ABOUT IT?

Just send us a metal core box for the core you wish to blow with your order for a Champion CB-5 (the "Junior"). We will prepare the box for blowing, adjust the blower to the box, and ship the whole outfit to you without delay. When the machine arrives, merely connect your air pressure, fill the hopper with sand, and you're ready to go!



CB-400 CB-18 CB-15 CB-12 CB-10

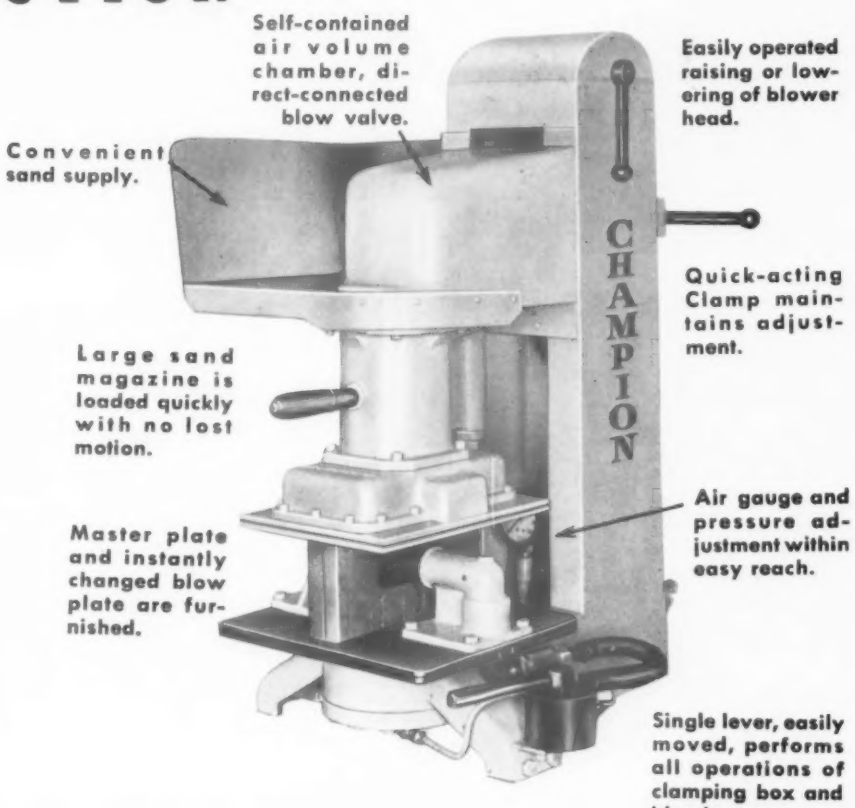
Clears the Way!-

CORE PRODUCTION

"JUNIOR"

IS A TRUE CHAMPION WITH ALL CHAMPION FEATURES

There's really so little work required that many foundrymen have difficulty believing their eyes, when they first try out a Champion. With the left hand, swing the head under the hopper and fill the magazine with sand. Then swing it back in blowing position, with box in place. A simple easy movement of the valve lever instantly operates both horizontal and vertical core box clamps and blows the core.


Self-contained air volume chamber, direct-connected blow valve.
Easily operated raising or lowering of blower head.
Convenient sand supply.
CHAMPION
Quick-acting Clamp maintains adjustment.
Large sand magazine is loaded quickly with no lost motion.
Air gauge and pressure adjustment within easy reach.
Master plate and instantly changed blow plate are furnished.
Single lever, easily moved, performs all operations of clamping box and blowing core.

ANY AIR LINE WITH 85 LBS. PRESSURE IS ADEQUATE TO OPERATE ANY CHAMPION CORE BLOWER.

***Again* HERE'S ALL YOU HAVE TO DO:**

Send us a core box to be used with a CB-5 core blower, along with your order. The machine will be shipped to you *ready to operate.* Merely supply air at 85 lbs. and sand.

• • •

Champion engineers and production specialists are glad at all times to give you the benefit of their long experience in helping you solve any mold or core making problems.

"JUNIOR"

IS ESPECIALLY ADAPTABLE TO SHORT RUNS

To change from one core box to another, from one type to another, is the work of only a second or two. Blow plate is instantly removable, without use of bolts, screws, clamps or latches. Base plate with air-operated clamps for vertically split boxes, is also instantly removable by merely lifting it off; no tools needed, no mechanical fasteners involved.

CHAMPION FOUNDRY AND MACHINE COMPANY

SALES OFFICE: 1853 W. MADISON ST. CHICAGO 7, ILLINOIS

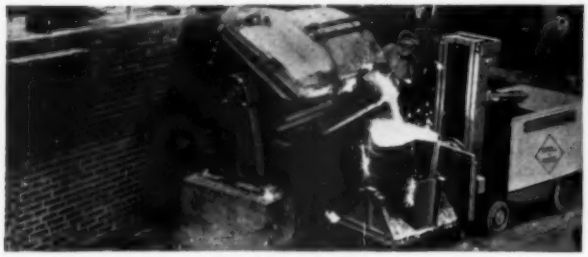
GENERAL OFFICE AND PLANT: ROCKFORD, ILLINOIS

MOLDING MACHINES CORE BLOWERS THE ELECTRIC RIDDLE

"By all means– get in touch with Elwell-Parker"

SAND

PIG IRON



FILLING LADLE

ANNEALING POTS

SLAG

DIAL THE E-P MAN TODAY!

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OVER 20 years ago an Executive of a leading Foundry wrote a competitor: "Get in touch with Elwell-Parker by all means." Today they are operating an even larger Elwell-Parker fleet—the pictures show typical loads.

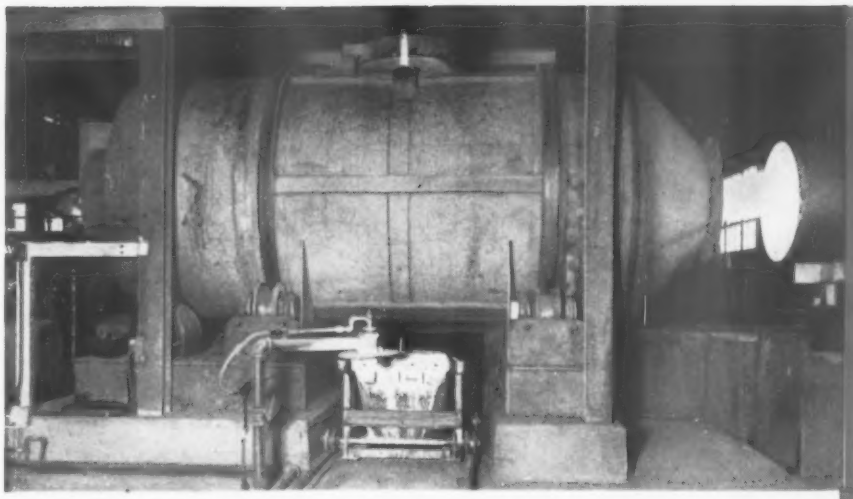
The E-P Man can help you find ways of producing *your* castings at lower cost, by eliminating waste in handling all of your foundry loads. It will pay you to dial him today.

The Elwell-Parker Electric Company, 4220 St. Clair Avenue, Cleveland 14, Ohio.

ELWELL-PARKER

POWER INDUSTRIAL TRUCKS

Established 1893



FROM SMELTER TO FOUNDRY

Oil-fired 20,000-pound Fisher Rotary Smelting Furnace at plant of I. Schumann and Company, well-known smelters and refiners, Cleveland, Ohio.

FISHER FURNACES

a complete line—from smelter to foundry

A complete line of smelting and melting furnaces is offered by Fisher . . . furnaces for the refiner of metals . . . furnaces for the foundry.

- Only 5 to 8 hours is required for the heating cycle in the 20,000-pound oil fired Fisher Rotary Smelting Furnace shown above compared to a 24-hour cycle in conventional reverberatory furnace. This short cycle permits heats to be run off during the working day . . . eliminates need for overtime . . . allows special orders to be run in smaller heats.
- Rotary feature allows easy control of pouring . . . no tapping as with reverberatory furnaces.

* * *

- The stationary gas-fired Fisher Melting Furnaces as shown at the right, feature convenient roll-back covers that seat perfectly. Hot surface of covers is always face downward so operator is not exposed to heat radiation. Furnaces are easily relined and all parts are quickly obtainable.
- Correct furnace atmosphere is automatically maintained by aspirator mixer and regulator. Heating is rapid and economical with low loss of metal.

Battery of stationary gas-fired Fisher Melting Furnaces in Cleveland jobbing foundry.

Fisher melting and holding furnaces are engineered for gas, oil, or electric heating. For induction heating a complete line of new Lindberg-Fisher electric induction melting and holding furnaces is available. For details call your Lindberg-Fisher representative.

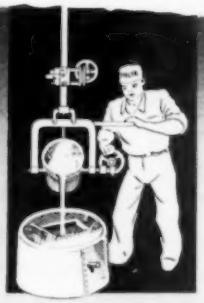
Now . . . A complete line of melting and holding furnaces—gas, oil, electric

Fisher Furnaces

A DIVISION OF LINDBERG ENGINEERING CO.

2453 WEST HUBBARD STREET · CHICAGO 12, ILLINOIS

FROM MONTREAL, CAN. TO MEXICO CITY, D.F.



. . AND FROM MAINE TO CALIFORNIA

THE NATION'S LEADING FOUNDRIES USE

DELTA FOUNDRY PRODUCTS

TO SPEED PRODUCTION OF FINER-FINISH CASTINGS AND CUT CLEANING ROOM COSTS

PLASTIC-TYPE CORE & MOLD WASHES

FOR STEEL, MALLEABLE, GREY IRON AND NON-FERROUS CASTINGS.
Highly refractory, Waterproof, Non-deteriorating.

•

PYRO-KOAT WASH

A powder-type wash. When applied as directed on green sand molds produces dry sand mold results.

•

BONDITE

The NEW Waterproof 100% dry binder.

•

PARTEX

The ORIGINAL and ONLY Nut Shell Parting.

•

SPRAY BINDERS

Produce dry sand mold properties.

Write for bulletins describing any, or all of the above DELTA Foundry Products.

NO-VEIN COMPOUND

Prevents veining and metal penetration.

•

CHILLKOAT

Eliminates use of metal chills on grey iron casting.

•

MUDDING COMPOUND

A highly refractory material for patching joints.

•

CORE ROD DIP OILS

Make stronger cores. Cause sand to adhere to core rods and wires, after baking.

•

SAND CONDITIONING OILS

Stop all sticking of sand in core boxes.

•

LIQUID PARTING, CORE OILS & BINDERS

If you want first-hand information on how DELTA Foundry Products will speed production of finer-finish castings and cut cleaning room costs in your foundry ASK FOR A LIBERAL WORKING SAMPLE for test purposes.

DELTA OIL PRODUCTS CO.

MILWAUKEE 9, WISCONSIN

HOW TO STOP LOSING DOLLARS

when making and baking cores

IN THE MIX . . .

By replacing part of the core oil with less expensive Hercules Truline Binder, you get quicker and more thorough core oil oxidation and a mix that costs less.*

IN THE OVEN . . .

Truline-bonded cores bake up to 25% faster than all-oil-bonded cores, save valuable time. They bake uniformly, often eliminate one extra trip through tower ovens.

IN STORAGE . . .

The moisture resistance of Hercules Truline Binder keeps cores stronger over longer storage periods.

IN POURING . . .

Truline-bonded cores give you a greater margin of safety at pouring time. *Truline* reduces the possibility of gas holes, scabs and blows, caused by unoxidized core oil.

IN SHAKE-OUT . . .

Truline-bonded cores, as opposed to pitch-bonded cores, burn out quickly, shake out faster, save up to 50% of valuable cleaning time. This saving alone makes Truline worth while.

HERCULES

TRULINE
REG. U.S. PAT. OFF.
BINDER

HERCULES POWDER COMPANY
920 King St., Wilmington 99, Del.

* The new leaflet, "Take a Tip from Me," gives specific recommendations. Write to

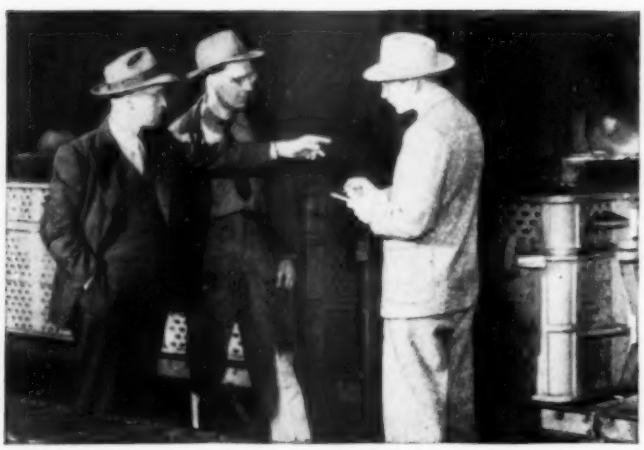
NF8-2

Mechanization

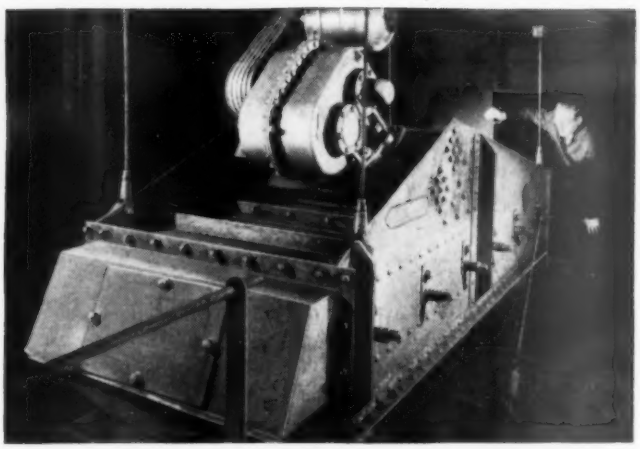
MAKES THE FOUNDRY A BETTER PLACE TO WORK!

"It eliminates dirty, disagreeable work . . . should result in lower production costs," says *well-known foundry expert.* Below, see how Allis-Chalmers' "Mechanized Equipment" is helping to do that very job in U. S. foundries!

NOTE: A-C *does not* offer foundry consulting or engineering service. It *cooperates* however with such firms in recommending foundry equipment which has been proven in Allis-Chalmers' own foundries.



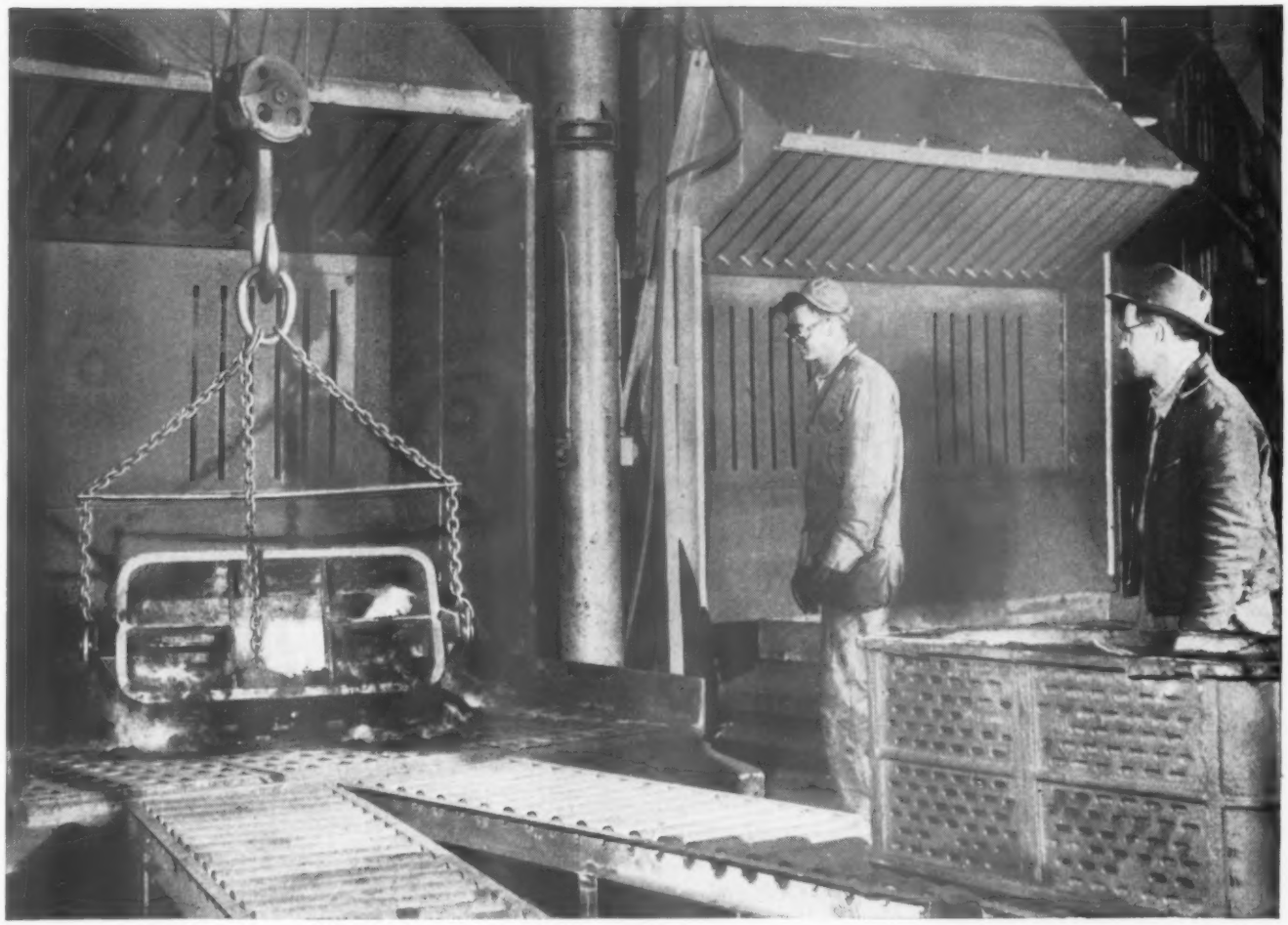
2. "OUR FOUNDRY HELP PROBLEM was licked by mechanization," says foundry operator. "Foundry shakeouts and screens have eliminated many heavy jobs . . . resulted in better control of dust and fumes, with casting output stepped up!" These statements are typical of the advantages accruing to foundries through better mechanization. A-C helps in other ways too. . . .



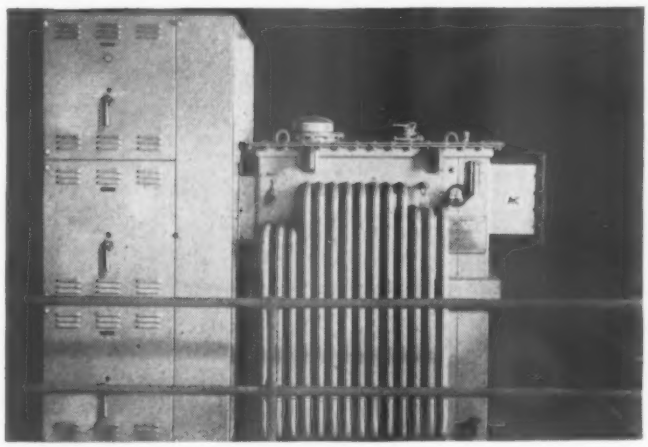
3. IN SAND RECLAMATION AND CONDITIONING. Vibrating screens for example, eliminated a scalping bottleneck for this foundry. A completely enclosed *Low-Head* screen and dust collector was installed which eliminated scalping problems. A complete line of A-C vibrating screens is available for all foundry screening jobs. Electrical improvements can help too. . . .

Foundromatic and Low-Head are Allis-Chalmers trademarks

For Bigger Output...Better Working Conditions...MECHANIZE with



1. GOOD EXAMPLE are these two *Foundromatic* 2-bearing shakeouts which in conjunction with a sand slinger have almost *tripled* the casting output for the same amount of floor space with no extra help! *Foundromatic* shakeouts are in stock now in sizes: 4′ x 6′ Capacity 4 tons—5′ x 8′ Capacity 7½ tons—6′ x 8′ Capacity 18 tons—8′ x 10′ Capacity 25 tons. Series or parallel combinations for higher capacities. Here's another example . . .



4. LINE LOSSES can cut into foundry profits. Allis-Chalmers load center substations improve voltage regulation . . . cut losses by bringing *rated* voltage to foundry equipment. They are easy to install and maintain . . . eliminate long, costly runs of heavy secondary circuits . . . help to step-up machine efficiencies. A range of sizes for most foundry applications.

5. DEPENDABLE FOUNDRY POWER with a-c and d-c motors. Fan-cooled motors lick dirt, moisture and corrosion! Bulletin 6092A covers complete foundry line. ALLIS-CHALMERS, MILWAUKEE 1, WIS.

A 2390 MEMBER

ALLIS-CHALMERS MANUFACTURERS OF STANDARDIZED EQUIPMENT FOUNDRY A-C MILWAUKEE

ALLIS-CHALMERS

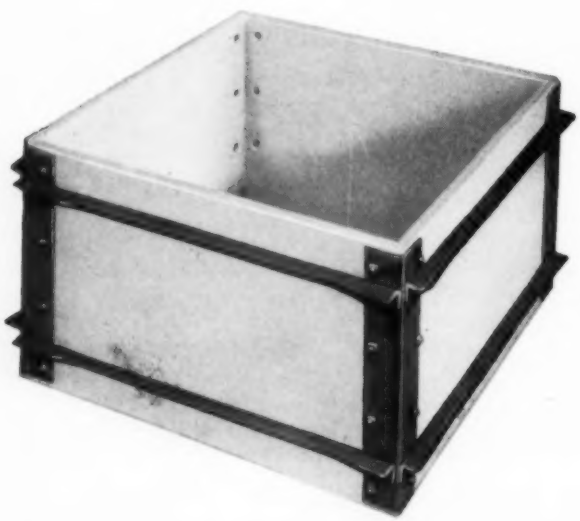
Stop Worrying About *SPILL OVERS!*

Change to

NON-BURN, NON-WARP SLIP JACKETS

On jackets up to 8" deep, *Single* Angle Irons are used—as illustrated.

On jackets over 8" deep, *Double* Angle Iron Reinforcements are used.



Molten metal can't hurt CMD Slip Jackets or cause them to stick and delay production. Made of Mon-asbestos one half inch thick, they won't burn. They fit smoothly and strip clean from the mold every time.

Rugged corner irons, 2" x 2" x 1/8" and cross reinforcing irons, 1" x 1" x 1/8" are bolted and arc-welded in place to prevent warping.

. . . When ordering specify:

(1) degree of taper,

(2) size of flask at parting line and

(3) dimensions of cope and drag to fit below and above parting line.

Write Today for Descriptive Circular!

CHICAGO MANUFACTURING & DISTRIBUTING CO.

Dept. F, 1928 West 46th Street **Chicago 9, Illinois**

MIDGET or GIANT

If it's a MOLDER MILWAUKEE CAN MAKE IT!

No. 266 GIANT MILWAUKEE Jolt Squeeze Stripper

with Roll on—Roll off Attachment. 24" and 26" piston sizes.

No. 103 Stationary Type Jolt Squeezer

Midget of the famous MILWAUKEE line of molding machines. 10" squeeze piston exerts total pressure of 6200 lbs. at 80 lb. line pressure. Fast and dependable for small jobs.

New MILWAUKEE JOLT SQUEEZE STRIPPER... does a BIG job in a BIG way

Are you constantly pushing the capacity of your present molders? Here's a Jolt Stripper that can handle really BIG molding jobs with ease, efficiency and safety. A 26" diameter squeeze piston accommodates flasks from 24" to 42" in width and provides a squeeze capacity of 53,000 lbs. at 100 lb. line pressure. The 12 high-capacity rollers are capable of sustaining a 3500 lb. load. Convenient grouping and easy operation of poppet type control valves, with new interlocking safety features. One man can readily roll-off 3000 lbs. The machine is quickly convertible to a Pin Stripper by substituting a pin lift attachment for roll on — roll off attachment. Investigate this new-GIANT molder . . . also other MILWAUKEE Molding Machines, Core Blowers and Core Grinders. Write for literature.

MILWAUKEE Foundry Equipment Co.

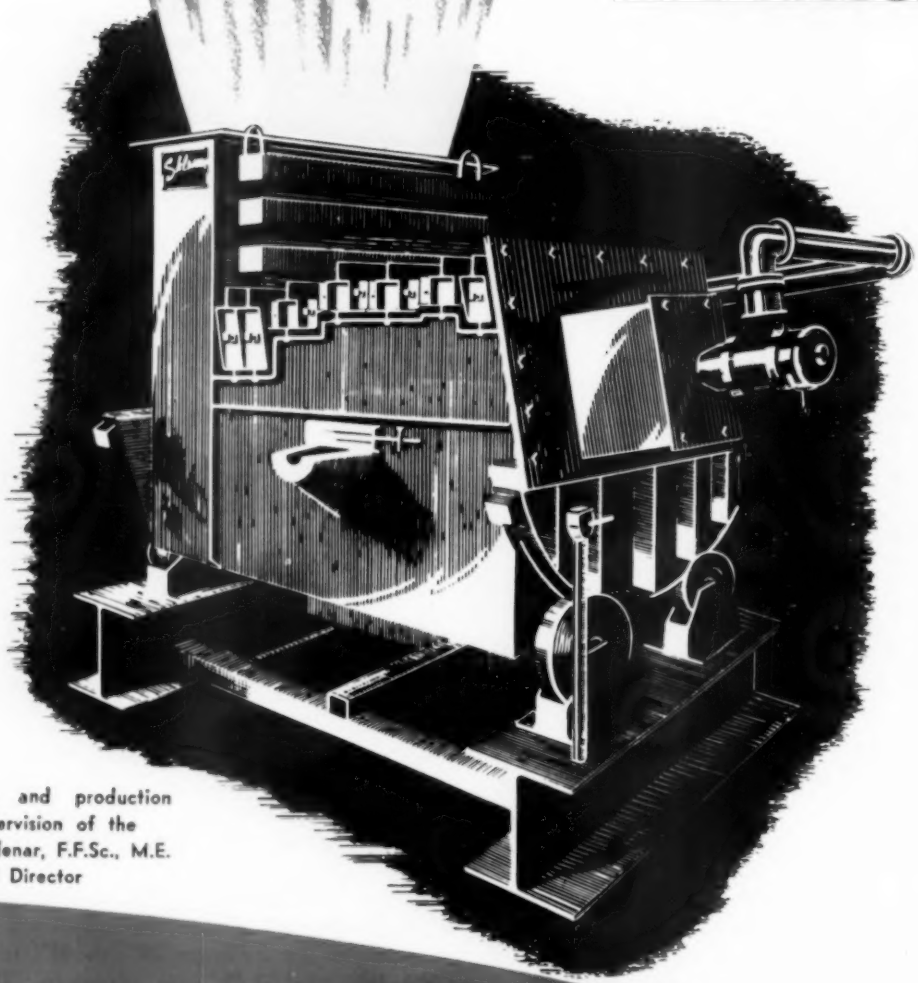
3238 W. PIERCE STREET, MILWAUKEE 4, WISCONSIN, U.S.A.

THE ORIGINAL

Sklenar

NEW IMPROVED REVERBERATORY FURNACES

The Modern Method of Melting Metals



All specifications and production under the supervision of the inventor, W. F. Sklenar, F.F.Sc., M.E. Technical Director

Patented, Patent Pending and Patents Applied for

SKLENAR FURNACE AND M

WILSON INDUSTRIES, IN

38 MEMORIAL DRIVE - - - - - - - - CA

.... Maintenance Economy means

COMPARISON OF COSTS
(RED BRASS)

	SKLENAR	COST	CRUCIBLE TILT	COST
Total weight melted	259,270 lbs.		259,270 lbs.	
Number of heats	432			
Total hours labor (maint.)	26	26.52	64	65.28
Number Crucibles used (#120)			8	176.00
Fire brick	78	15.60		
Cement used	100 lbs.	8.90	400 lbs.	35.60
Fire clay used	400 lbs.	12.00	600 lbs.	18.00
Total hours labor daily for preparation	None		172 hrs.	175.44
Time of heats for melt	17 min. (600 lbs.)		40-50 min. (360 lbs)	
Total Maintenance Cost		$63.02		$470.32

GREATER PROFITS

Alert foundrymen find the NEW IMPROVED SKLENAR REVERBERATORY FURNACE a boon in reducing melting costs . . . in increasing production of superior metals. The SKLENAR is the ONLY furnace that gives perfect combustion . . . perfect atmosphere control. Maintenance costs minimized; producible tonnage maximized. Write for our descriptive circular F-1 for complete details and specifications.

MANUFACTURING COMPANY
INCORPORATED *Sole Distributors*
CAMBRIDGE 42, MASS.

PATENTED

Malleabrasive

GIVES YOU

Matches the Potential Efficiency of Modern Airless Blast Cleaning Machines

Malleabrasive enables you to realize bigger returns on your investment in your airless blast cleaning equipment because it enables you to obtain the high-speed, big-production cleaning which such equipment is intended to provide.

Why limit the usefulness and productive capacity of your modern cleaning units by using ordinary abrasive or chilled iron shot and grit when MALLEABRASIVE can increase your output of cleaned castings, reduce your maintenance and parts replacement costs, lower your abrasive consumption?

- 2 to 4 TIMES LONGER WEAR
- 65% LESS MACHINE REPAIR
- UP TO 50% LESS CLEANING COSTS
- REDUCES MACHINE IDLE TIME

See Malleabrasive in action at Philadelphia, American Foundrymen's Association, Booth # 819

The Only Blast Cleaning Abrasive of Its Kind!

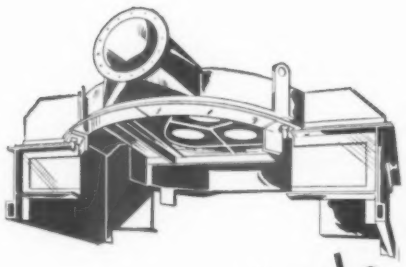
Malleabrasive is produced under patent by the exclusive Malleabrasive process and is not to be confused with ordinary shot and grit described "Heat-treated" or "annealed," or by trade names connoting such treatments. The performance of Malleabrasive in rendering over-all savings in blast cleaning costs as compared with chilled iron shot—regardless of how such material is described—*is guaranteed* when comparative test runs are properly conducted.

Malleabrasive Savings Proven. You don't have to accept mere claims for Malleabrasive savings; they are proven by performance and actual records from many plants. Over 300 plants now using it. The use of thousands of tons over the past nine years has proven its merits.

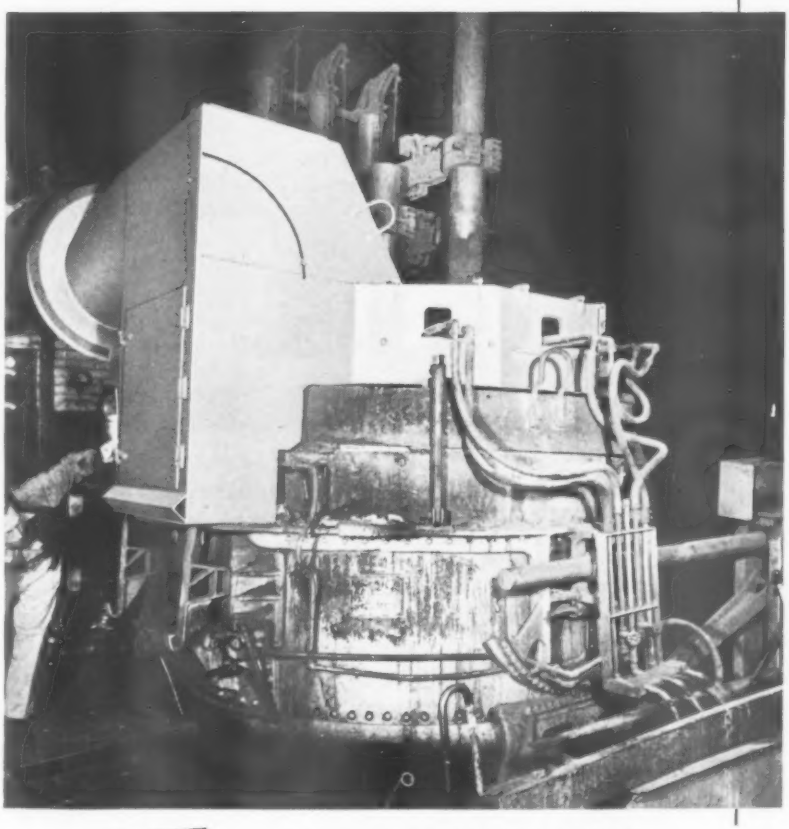
Prove Savings for Yourself. Whether you clean grey iron, malleable or steel castings, Malleabrasive will show definite savings for you in airless blasting equipment. Our blast cleaning engineers will show you the way.

PITTSBURGH CRUSHED STEEL CO.
ARSENAL STATION PITTSBURGH 1, PA.

LASTS LONGER • INCREASES PRODUCTION OF CLEANED CASTINGS



Include the Electric Furnace In This Year's Clean-Up Campaign



AAF Furnace Hood and Type N Roto-Clone Remove Irritating Smoke and Fumes Without Restricting Efficiency

ELECTRIC furnace smoke and fumes can be controlled—positively and practically—with the installation of an AAF Furnace Hood and Type N Roto-Clone* hydrostatic dust collector.

It's a perfect working combination. The AAF Hood, which confines the smoke and fumes at the source, is designed not to interfere with furnace movement for pouring, slagging, or charging. The Type N Roto-Clone applies positive local exhaust at the electrodes, charging door and pouring spout. Being a wet-type collector, a high percentage of the oxides and smoke are scrubbed from the airstream before it is exhausted, thereby eliminating a potential community nuisance.

The AAF Furnace Hood is applicable to either side or top-charge furnaces of all makes and sizes. Its heavy construction prevents sagging or warping and provides a dependable work platform for furnace service.

Plan now to convert your furnace to smoke and fume-free operation before another winter season rolls around. For complete information, call your local AAF representative, or write direct.

GET THE COMPLETE STORY—NEW FREE BULLETIN AVAILABLE

Complete design and performance data on the AAF Furnace Hood and Roto-Clone Dust Control is contained in this new illustrated bulletin. Ask for Bulletin No. 278-A.

AMERICAN AIR FILTER COMPANY, INC.
266 Central Ave., Louisville 8, Ky.
In Canada: Darling Bros., Ltd., Montreal, P. Q.

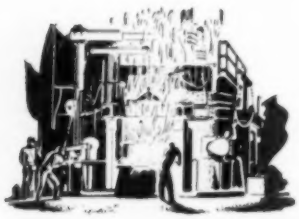
*Roto-Clone is the trade-mark (Reg. U.S. Pat. Off.) of the American Air Filter Company, Inc., for various dust collectors of the dynamic precipitator and hydrostatic precipitator types.

®AAF

ROTO-CLONE® DUST CONTROL EQUIPMENT

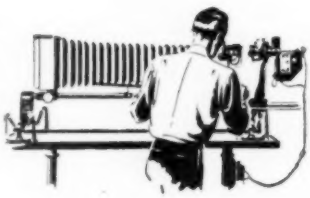
How ELECTROMET Serves the Steel Industry

IN addition to providing a full line of high-quality ferro-alloys and alloying metals, Electro Metallurgical Company serves steelmakers in other important ways:



Field Metallurgists — You can obtain the help of our trained metallurgists who render on-the-job assistance in the use of ferro-alloys. These men are qualified to suggest the grades and sizes of alloys best suited for your particular steel and practice.

Laboratory Research— You can benefit by the new alloys developed by our continuous laboratory research. Developments from this research include the low-carbon ferro-alloys, silicomanganese, SILCAZ alloy, calcium metal, calcium-silicon, and ferrocolumbium.



Experience—Our store of information about ferro-alloys and their use, based on over 40 years' experience in producing them, is available to the steel industry.

Technical Booklets—You will find helpful information about ferro-alloys and metals in ELECTROMET's free technical booklets and reprints. Among these are "ELECTROMET Products and Service" and "ELECTROMET Ferro-Alloys and Metals." Write to our Technical Service Department to obtain copies of these booklets.

Convenient Stocks — You can count on prompt deliveries of ferro-alloys from ELECTROMET, since our offices, plants, and warehouses are conveniently located to insure efficient service.

ELECTROMET Ferro-Alloys and Metals

Information about these and other alloys and metals produced by ELECTROMET is contained in the booklet, "ELECTROMET Products and Service." Write for a copy.

CHROMIUM . . . Low-Carbon Ferrochrome (in all grades from 0.03% maximum to 2.00% maximum Carbon), Nitrogen-Bearing Low-Carbon Ferrochrome, High-Carbon Ferrochrome, SM Ferrochrome, Chromium Metal, CMSZ Mix, and other Chromium Alloys.

VANADIUM . . . Ferrovanadium in all grades and Vanadium Oxide.

COLUMBIUM . . . Ferrocolumbium.

MANGANESE . . . Standard Ferromanganese, Low-Carbon and Medium-Carbon Ferromanganese, Low-Iron Ferromanganese, Manganese Metal, and other Manganese Alloys.

SILICOMANGANESE . . . Max. 1.50 and 2.00% Carbon Grades.

TUNGSTEN . . . Ferrotungsten, Tungsten Powder, and Calcium Tungstate Nuggets.

BORON . . . Ferroboron, Manganese-Boron, Nickel-Boron, and SILCAZ Alloy.

SILICON . . . Ferrosilicon in all grades including both regular and low-aluminum material, Silicon Metal, SMZ Alloy, and other Silicon Alloys.

TITANIUM . . . Ferrotitanium, Silicon-Titanium, and Manganese-Nickel-Titanium.

CALCIUM . . . Calcium-Silicon, Calcium-Manganese-Silicon, and Calcium Metal.

"EM" BRIQUETS . . . Silicon, Silicomanganese, Ferromanganese, and Chromium Briquets.

ZIRCONIUM . . . 12-15%, and 35-40% Zirconium Alloys, and Nickel-Zirconium.

"CMSZ," "Electromet," "EM," "Silcaz," "SM," and "SMZ" are trade-marks of Electro Metallurgical Company.

ELECTROMET Ferro-Alloys and Metals are sold by Electro Metallurgical Sales Corporation. Offices: Birmingham—Chicago — Cleveland — Detroit — New York — Pittsburgh — San Francisco.

Electromet
Trade Mark
Ferro-Alloys and Metals

Electro Metallurgical Company
Unit of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.

In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario

OUTPUT WAS 150... NOW 600

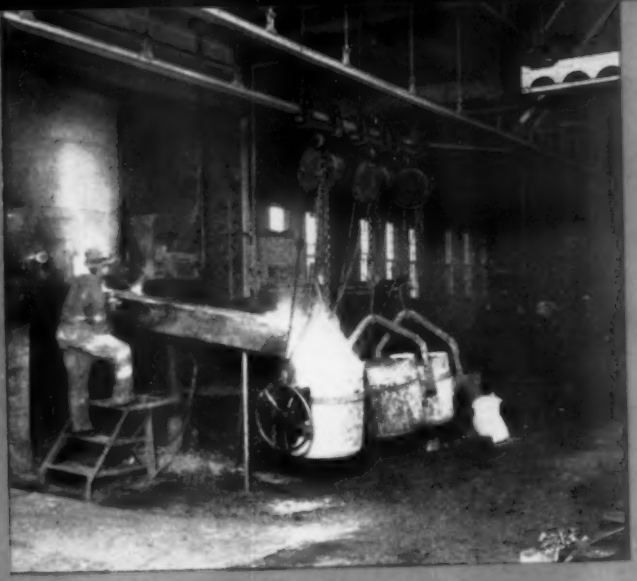
THIS manufacturer of bottle washing machines was using flexible shaft type grinders with 1¼" cones to clean flash off bottle grippers. Speed was 3600 R.P.M. Output per man per day was 150. The Rotor Application Engineer saw the job and recommended M-1086 Rotor Cone Wheel Grinders. Their speed is 17,000 R.P.M. They were installed with these results:

Labor cost cut 75%. Output was increased from 150 to 600 pieces per day. One man now does the work of four with slower speed grinders.

Wheel cost cut 80%. Cone wheels with old grinders were good for 30 pieces. With high speed Rotor tools, they're good for 150.

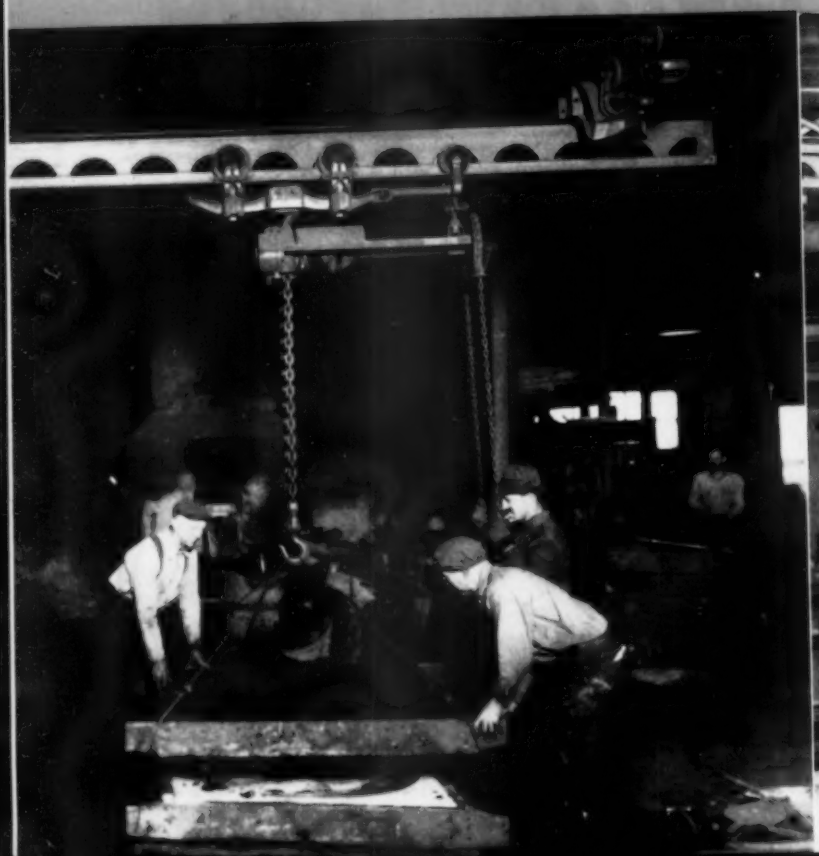
The Rotor Application Engineer may find similar savings in your production.

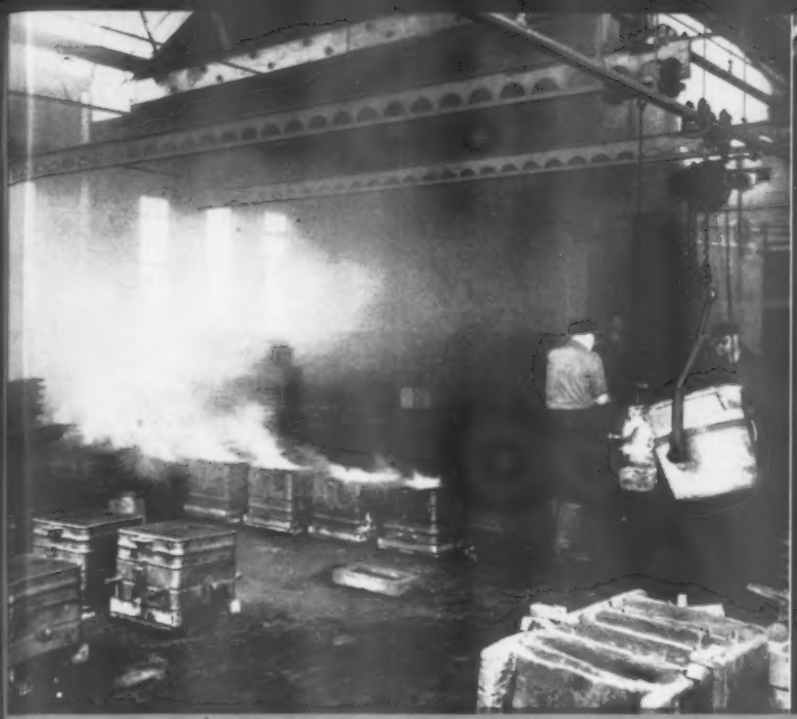
THE ROTOR TOOL CO.
CLEVELAND, OHIO
UNBIASED ANALYSIS OF PORTABLE TOOL PROBLEMS



...PRODUCTION

A VITAL WORD SYNONYMOUS WITH CLEVELAND TRAMRAIL



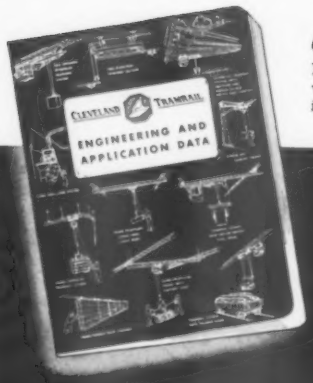


CLEVELAND TRAMRAIL SPEEDS FOUNDRY PRODUCTIO

Today one of the most vital words in the dictionary is PRODUCTION. Every device conceivable is being considered or adopted that will aid the output of a plant. This holds true in foundries. Castings of every kind are needed badly.

When one considers that from 25 to 100 tons of materials (such as sand, flasks, molds, cores, pig iron, scrap, molten iron, rough castings) are handled to produce one ton of finished castings, the importance of the labor and time required for handling is more fully appreciated. Indeed, one of the most important ways of stepping up production in a foundry is through use of equipment that will facilitate handling.

In hundreds of foundries Cleveland Tramrail has eliminated a vast amount of unnecessary rehandling and greatly reduced manual drudgery. Because of this modern overhead materials handling equipment many more tons of castings are being produced with the same facilities and labor.



GET THIS BOOK!

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
3817 EAST 286th ST. *WICKLIFFE, OHIO.*

CLEVELAND TRAMRAIL

OVERHEAD MATERIALS HANDLING EQUIPMENT

Dallett Pneumatic Vibrators

Precision Built to Meet Your Foundry Needs

DALLETT Pneumatic Vibrators are valveless, simple in design, but sturdy in construction. They are engineered for dependability, long life and top performance.

They are made in two series, the "MPV" for Match Plate Foundry work, and the "M" Series for heavy forms, loading hoppers, dust arrestors and for many other heavy duty requirements.

Illustrated is the Dallett "MPV"—7. This series is available in four sizes.

Only One Moving Part

Both Series of Dallett Pneumatic Vibrators have *but one moving part —the piston.* There are no springs to be replaced. Dallett's springless construction means less breakdowns for you, saves costly replacement time and money.

Trouble-free Construction *Means More Production*

Smooth operation and high efficiency are assured in all Dallett Vibrators because of their *precision* construction. All barrels and pistons are carefully heat treated and precision ground. Standardize on Dallett Pneumatic Vibrators for maximum performance.

Send for Bulletin 100

This bulletin fully describes and illustrates Dallett's Line of Pneumatic Tools. For Dallett Forged Products ask for Bulletin #200. Complete Airline Accessories are covered by Bulletin #300.

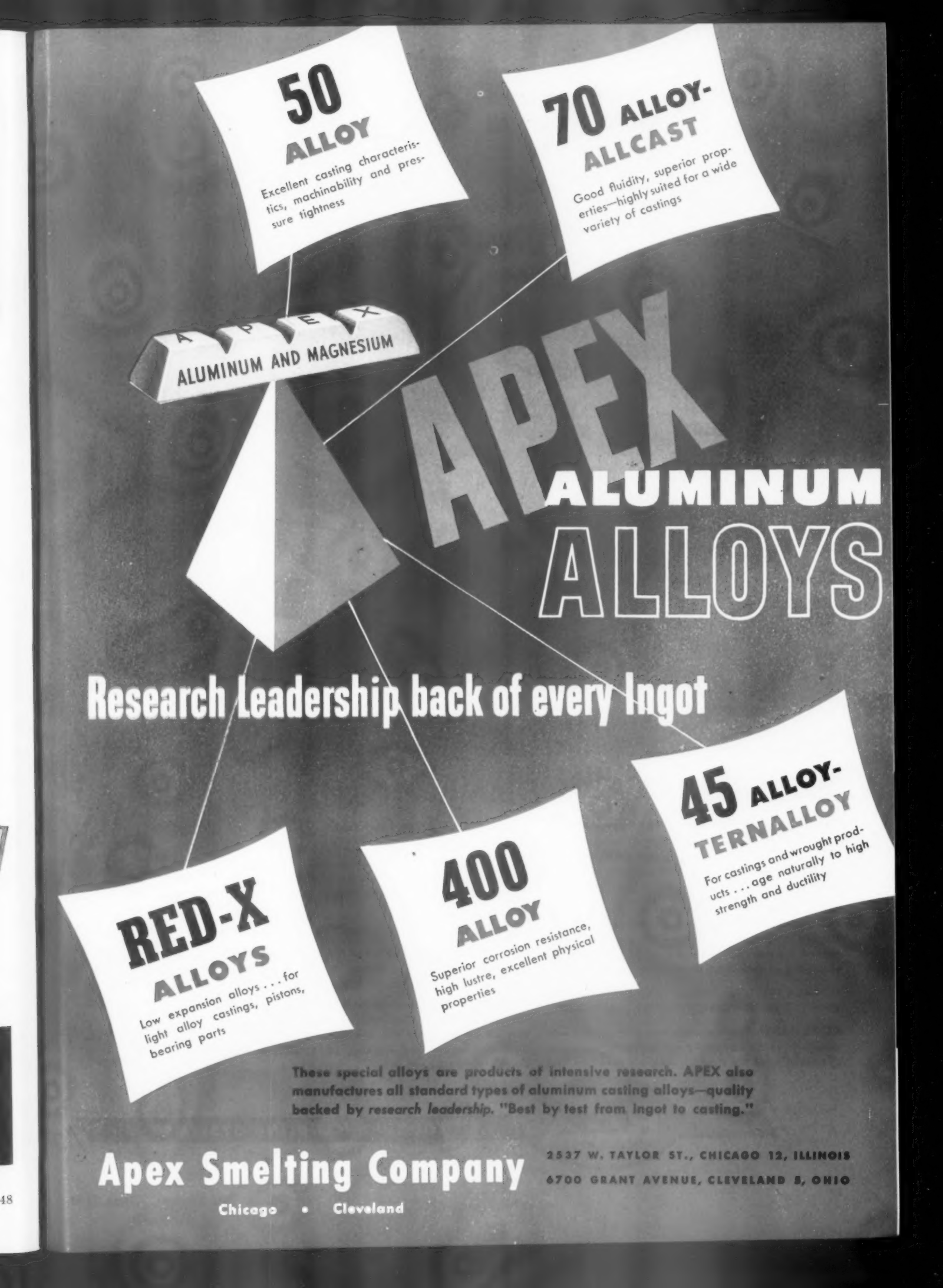
TOOL MAKERS
PNEUMATIC
DALLETT EQUIPMENT
ACCESSORIES
SINCE 1883

THE DALLETT COMPANY

MASCHER AT LIPPINCOTT STREET, PHILADELPHIA 33, PA.

Manufacturers of Pneumatic Tools and Accessories

DISTRIBUTORS in principal cities throughout the United States, Canada, Europe and South America.


50
ALLOY
Excellent casting characteristics, machinability and pressure tightness
70 ALLOY-
ALLCAST
Good fluidity, superior properties—highly suited for a wide variety of castings
APEX
ALUMINUM AND MAGNESIUM
APEX
ALUMINUM
ALLOYS
Research Leadership back of every Ingot
45 ALLOY-
TERNALLOY
For castings and wrought products . . . age naturally to high strength and ductility
RED-X
ALLOYS
Low expansion alloys . . . for light alloy castings, pistons, bearing parts
400
ALLOY
Superior corrosion resistance, high lustre, excellent physical properties
These special alloys are products of intensive research. APEX also manufactures all standard types of aluminum casting alloys—quality backed by research leadership. "Best by test from ingot to casting."
Apex Smelting Company
Chicago • Cleveland
2537 W. TAYLOR ST., CHICAGO 12, ILLINOIS
6700 GRANT AVENUE, CLEVELAND 5, OHIO

...IN PREPARING MATERIALS?

How many moves . . . how many tons of materials must the average foundry move to produce one ton of castings? Let's figure it out, using only the materials preparations section of a foundry flow chart shown here.

METALS. It takes an average of 1.3 tons of metal to produce a ton of castings. Move that metal from storage — to melting — to pouring — and you've moved 1.3 tons twice for a total of 2.6 tons plus returning of gates and risers for remelt.

COKE, ETC. From storage — to melting — you move .12 average tons. Total, .12 tons handled.

CORE SAND. From storage—to preparation—to cores—to racks—to ovens—to molders, you move .5 tons of sand five times. Total, 2.5 tons handled —plates and driers not included.

SAND PREPARATION. From Shakeout—to iron removal—to screen—to storage—to mullers for tempering—to molders, you move 6 tons of sand six times. Total, 36 tons handled.

SAND REJECTS. From preparation tower — to dump, you move 3 tons. Total, 3 tons.

TOTAL TONS. 44.22 tons of materials moved to produce one ton of castings in just this small section of the total foundry operations.

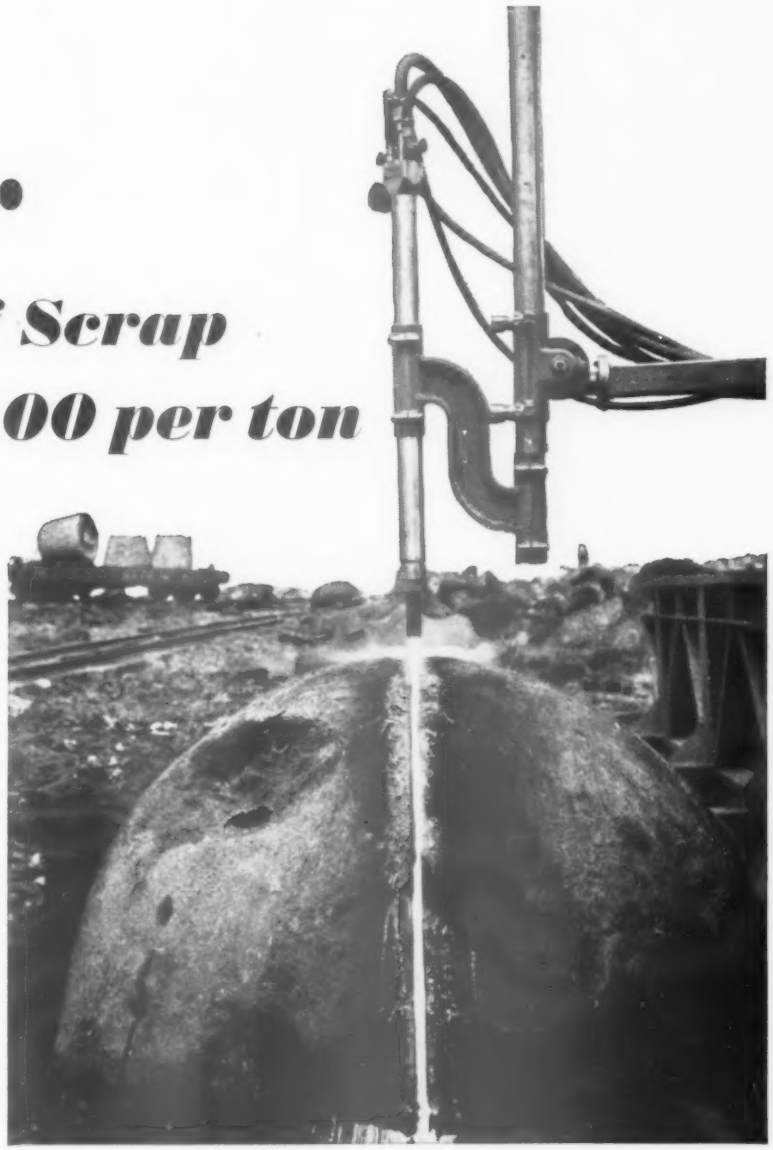
A Rex Foundry Engineer will be glad to show how a cost reducing and efficient flow of materials can be achieved by the use of a Rex Foundry System. Chain Belt Company, 1671 West Bruce Street, Milwaukee 4, Wis.

CHAIN BELT REX COMPANY

FOUNDRY HANDLING SYSTEMS

FOUND...

15,000 Tons of Scrap at less than $5.00 per ton



Here's how thick ladle skulls are cut to charging box size by the OXWELD C-45 blowpipe.

Here's the story at one steel mill. This mill had accumulated 15,000 tons of skulls and buttons—with nothing to do but bury them. All these became good usable scrap, however, when LINDE showed how they could be cut to charging-box size.

Large skulls, four to six feet in thickness—too thick for oxy-acetylene cutting without some reduction in size, were first pierced by conventional oxygen lancing techniques, and then split in half by blasting. These pieces, and the smaller skulls, such as illustrated, were cut with the oxy-acetylene blowpipe to sizes convenient for charging into the furnace. Of course, many skulls contained inclusions of slag or brick that made normal cutting methods useless. This is the problem that was solved by LINDE's Process Engineering Service.

Total costs to the steel mill averaged less than $5.00 per ton. Because of the economy and ease of operation, reclamation of all skulls has become standard practice at this mill.

Further development work by LINDE points toward greater economies. Field tests just completed on an improved blowpipe have shown that greater depths of cut and lower oxygen consumption rates can be obtained in cutting skulls. The necessity for lancing and blasting will probably be eliminated.

For further information, please inquire at your nearest LINDE Office.

What you can do to help get much-needed scrap to steel mills:

1. Check every scrap source at your plant.
2. Classify and segregate.
3. Move scrap fast through your local scrap dealer.

Linde
Trade-Mark

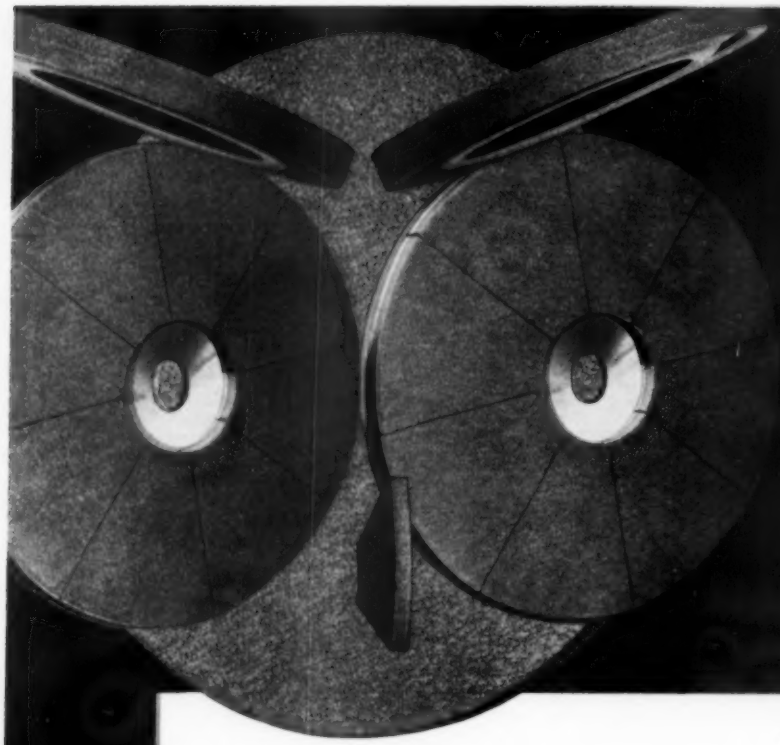
THE LINDE AIR PRODUCTS COMPANY

Unit of Union Carbide and Carbon Corporation

30 East 42nd St., New York 17, N. Y. UCC Offices in Other Principal Cities

In Canada: DOMINION OXYGEN COMPANY, LIMITED, Toronto

The words "Linde" and "Oxweld" are registered trade-marks of Union Carbide and Carbon Corporation or its Units.



Want to hoot at grinding costs?

Might some of your profits be falling prey to excessive grinding expense? Are your wheel-wear and dressing costs higher than they should be, or your wheel life shorter?

You're afraid they might be?

Then call in a Peninsular engineer. That's the *wise* way to hoot at grinding costs!

Your Peninsular engineer will give your machines and methods, the materials you grind and the finishes you need a thorough analysis.

His recommendations and suggestions to you will be founded on *facts* and first-hand observation. And the wheels he prescribes for your grinding will be individually tailored to fit your needs.

Peninsular engineers have chased down hard-to-find profit leaks in the grinding departments of nearly every field of industry.

When may they put this experience to work for you?

The Peninsular Grinding Wheel Co., 729 Meldrum Ave., Detroit 7. *Sales Offices:* Chicago, Philadelphia, Buffalo, Cleveland, Pittsburgh, Houston, St. Louis, Cincinnati.

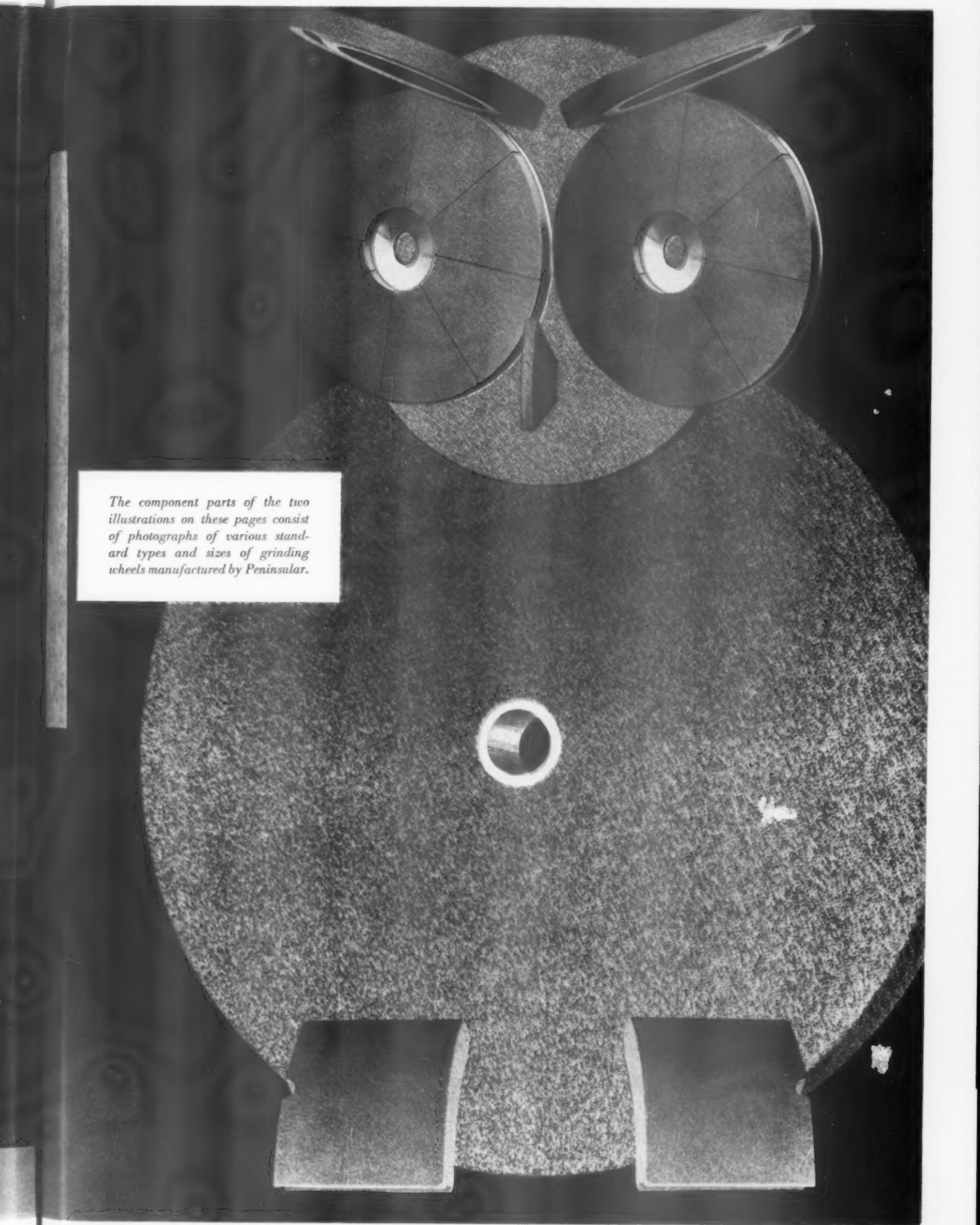
PENINSULAR

INDIVIDUALLY PENINSULAR *ENGINEERED*

GRINDING WHEELS

SINCE 1889

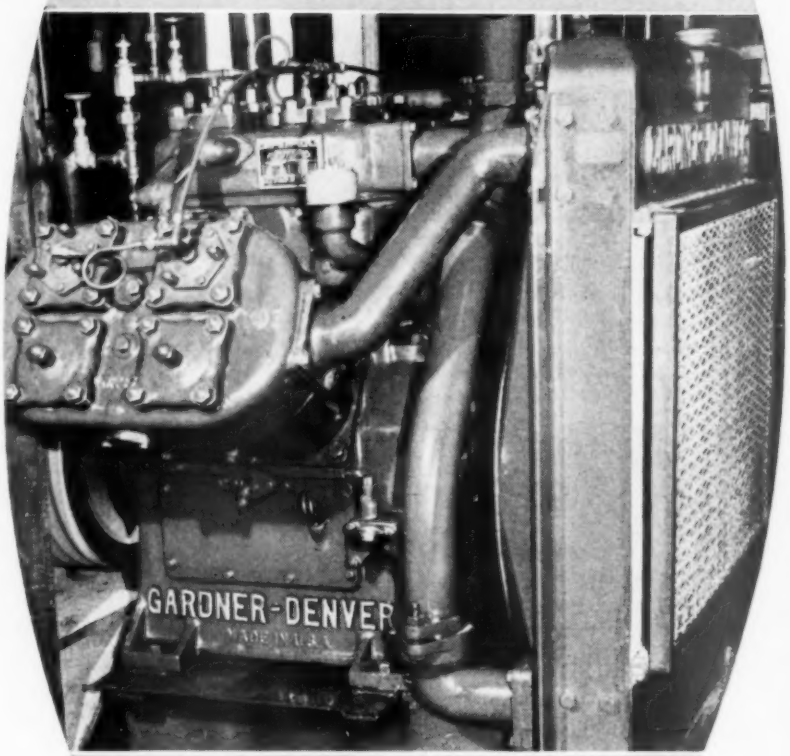
SPECIALISTS IN RESINOID BONDED WHEELS



The component parts of the two illustrations on these pages consist of photographs of various standard types and sizes of grinding wheels manufactured by Peninsular.

You get ALL THREE with a "WB" . . .

- Greater air output
- In less space
- At lower cost



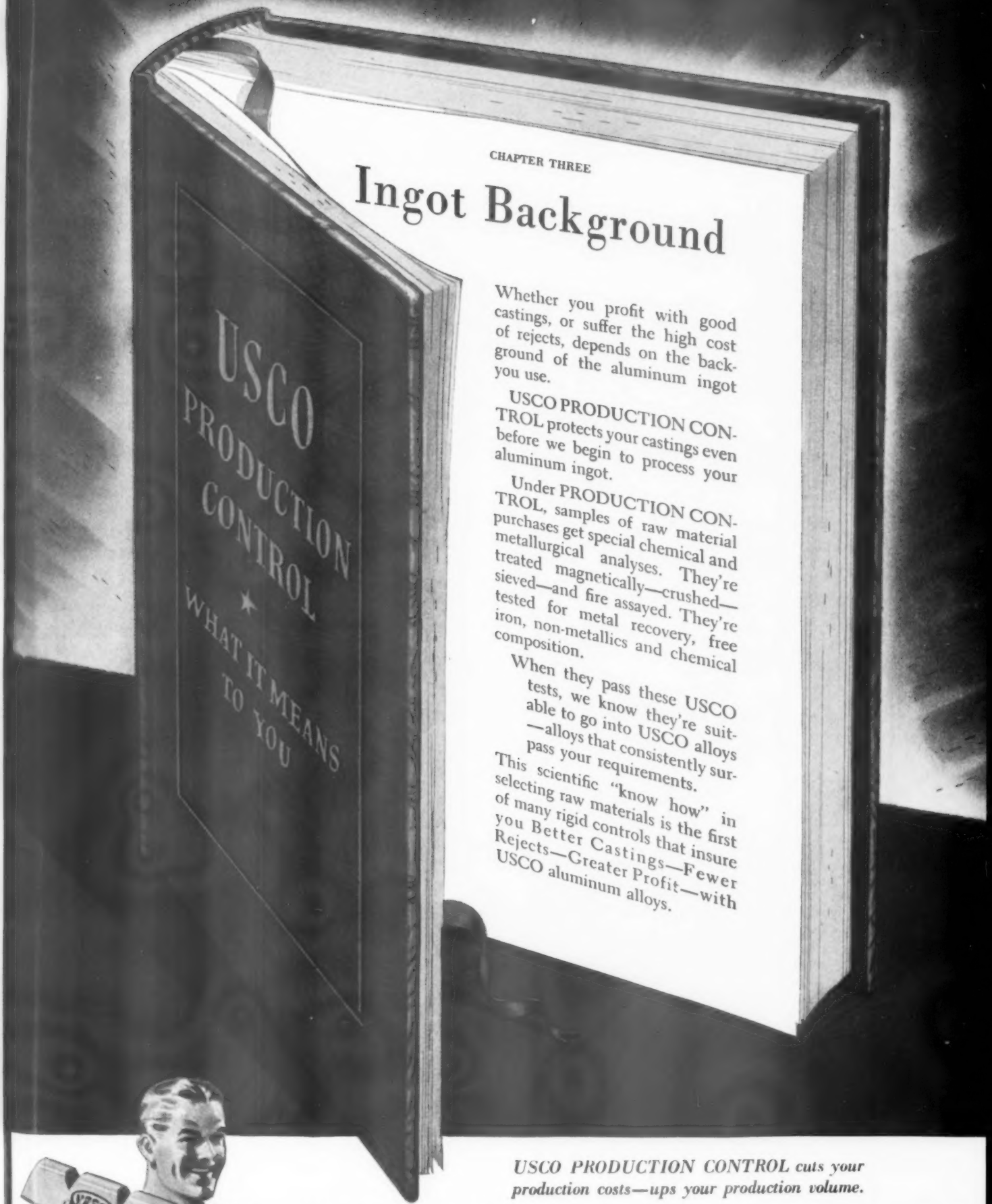
Gardner-Denver "WB" Two-Stage, Water-Cooled Compressor

Gardner-Denver "WB" Vertical Compressors have the compactness you need for installation in limited space . . . yet because of their special design, these compressors have high efficiencies. Air output is much greater than that obtained with single-stage compressors of equivalent piston displacement. All cylinders are completely water-jacketed, assuring reliable operation in any temperature and at any altitude. Other valuable "WB" features are:

- *Combination radiator and air-cooled intercooler permits use where cooling water is scarce or of poor quality.*
- *Completely water-jacketed cylinders for maximum operating efficiency in any temperature or at any altitude.*
- *Duo-Plate cushioned air valves—simple, durable, unusually quiet.*
- *Timken tapered roller main bearings.*
- *Crankcase of GarDurloy alloy—completely enclosed, dust tight, oil tight.*

For complete information, write Gardner-Denver Company, Quincy, Illinois.

GARDNER-DENVER
SINCE 1859



CHAPTER THREE

Ingot Background

Whether you profit with good castings, or suffer the high cost of rejects, depends on the background of the aluminum ingot you use.

USCO PRODUCTION CONTROL protects your castings even before we begin to process your aluminum ingot.

Under PRODUCTION CONTROL, samples of raw material purchases get special chemical and metallurgical analyses. They're treated magnetically—crushed—sieved—and fire assayed. They're tested for metal recovery, free iron, non-metallics and chemical composition.

When they pass these USCO tests, we know they're suitable to go into USCO alloys —alloys that consistently surpass your requirements.

This scientific "know how" in selecting raw materials is the first of many rigid controls that insure you Better Castings—Fewer Rejects—Greater Profit—with USCO aluminum alloys.

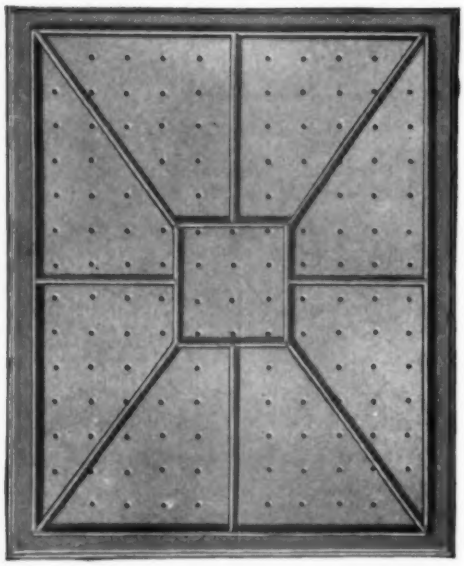
USCO PRODUCTION CONTROL cuts your production costs—ups your production volume.

USCO ALUMINUM

Pioneer Producers of Quality Aluminum Ingot

U. S. REDUCTION CO. *East Chicago, Ind.*

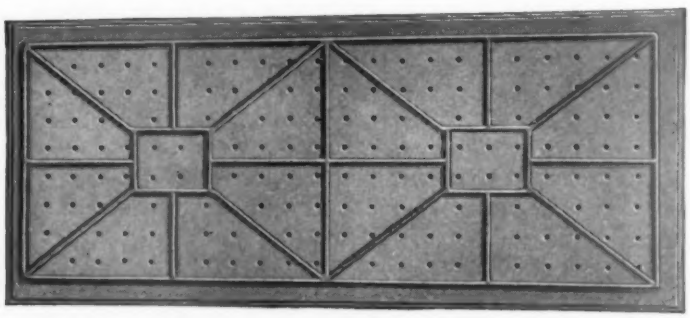
DIAMOND CUSTOM-BUILT
CORE PLATES



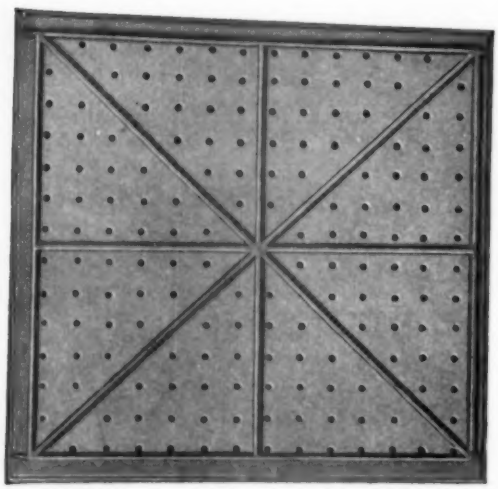
STYLE CP-3—This type reinforcing on "square" plates for loads up to 1200 lbs. Typical sizes run 40" x 50" and 36" x 60".

CARRY CORES UP TO 1200 LBS. WITHOUT DEFLECTION!

Less baking time with Diamond Plates . . . because sturdy construction with light weight is achieved. They heat up and cool more quickly. Fabricated from ½" or heavier plate as indicated to meet load requirements, users acclaim the long-life and uniform quality of Diamond Plates. Available in special and standard sizes to suit your exact requirements.



STYLE CP-2—For long and narrow cores and loads to the 1200 lb. range. Note web-bracing construction.



STYLE CP-1—This construction used on plates in the 30" x 30" range for core loads up to 200 lbs.

HOW TO ORDER DIAMOND CORE PLATES

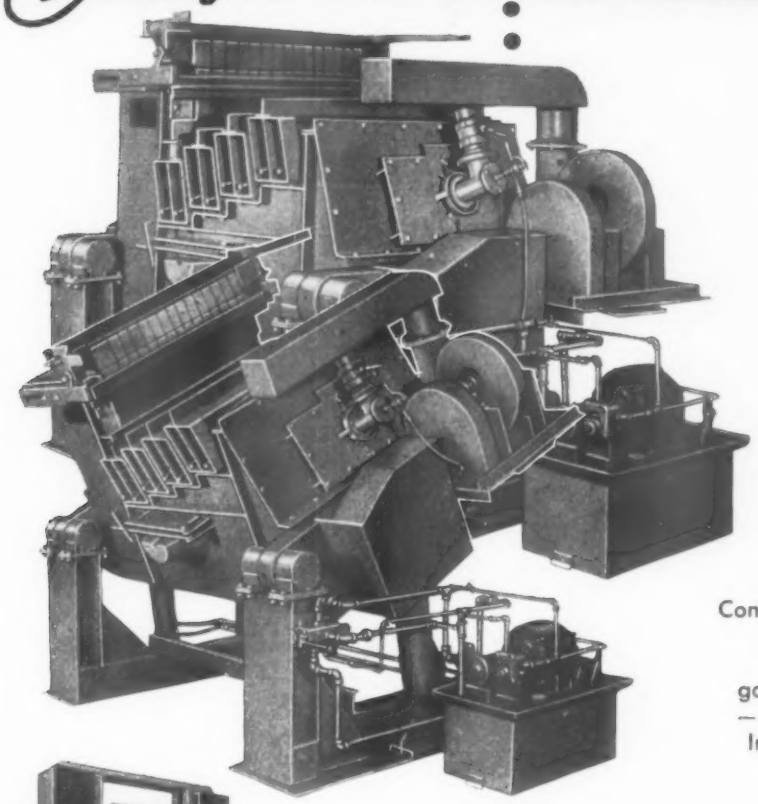
Since we recommend "job fitted" plates for real production efficiency, we suggest your telling us *how heavy your core loads will* be and the *approximate overall plate* size. We will design reinforcing accordingly, and quote in terms of plates best suited to your needs.

DIAMOND

Telephone 2553 **CLAMP AND FLASK COMPANY** Richmond, Indiana

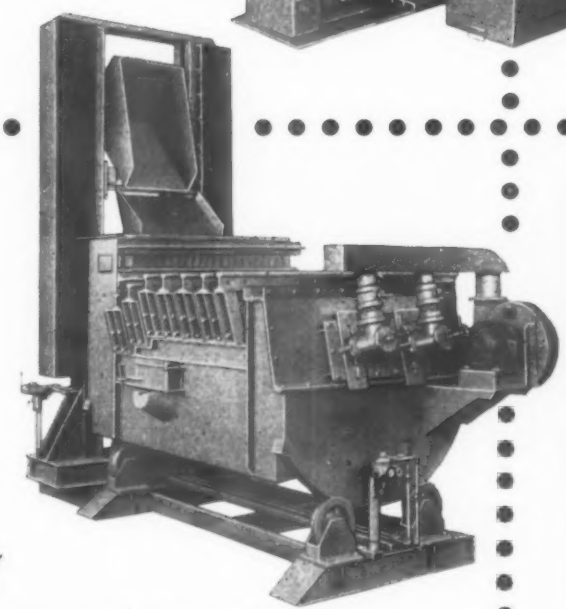
Designers of* CORE PLATES, JACKETS, BANDS, FLASKS *since 1889

Engineered TO MEET MODERN TREND



Stroman Economelt Furnaces now embody STATIONARY LIP POUR!

Stroman Economelt Direct Fired Reverberatory Furnaces now incorporate STATIONARY LIP POUR in their operation. This innovation which assures a constant pouring arc eliminates the necessity of moving the ladle at any time during a pour. It makes this furnace ideal for use with monorail, crane or buggy receptacles . . . speeds production and saves metal. Designed for fastest melting of Brass, Bronze, Grey Iron or Aluminum its efficient operation will effect up to 40% savings in fuel costs. Continuous charging, with cold metal never reaching the molten bath, makes it practically a continuous pour furnace. Economelt Furnaces may be fired by either gas or oil and are also available with combination gas — oil burners. Capacities range up to 2000 lbs. (Brass). Investigate its possibilities in your foundry, die casting or permanent mold plant at once.



★

Stroman manufactures all types of fuel fired furnaces for the melting of Iron, Grey Iron, Brass, Magnesium, Aluminum, and all other nonferrous alloys. Their efficient operation is unsurpassed in Foundries, Die Casting and Permanent Mold Plants. Write to-day for full information. Stroman Engineers will gladly consult with you on any of your melting room problems.

STROMAN SKIP HOISTS

For mechanical charging in conjunction with all Stroman Reverberatory Furnaces. Designed to give greatest efficiency to all charging operations . . . saves time and labor . . . easy to install . . . mechanizes the complete metal melting process. Built for either mechanical or pneumatic operation, in sizes to suit individual needs or furnace capacities.

STROMAN FURNACE & ENGINEERING CO.

DIVISION OF

THE PETERSEN OVEN CO. • 9900 FRANKLIN AVE. • FRANKLIN PARK, ILL.

MOLDED TO PERFECTION!

SMITH L-O CORE OIL

No Sacrificing of Quality to Maintain Quantity

Even though the demand for Smith L-O Core Oil is greater than ever before, we insist that the highest possible quality be maintained at all times. Suggestions that below standard materials or substitutes will serve equally as well are completely disregarded, as we will under no circumstances sacrifice *quality* to maintain *quantity.*

The same materials that have for years made Smith L-O Core Oil a uniform, high-quality binder are being used today. Remember, too, that this essential foundry product is Dow-Therm* processed to assure greater homogeniety and constant control of every batch. You will find 20 grades of Smith L-O Core Oil available at the representatives listed. Use it always . . . for better castings.

* The *only* core oil treated by this method.

Smith L-O Core Oil

CORE WASH ROD DIP LIQUID PARTING

Smith L-O Core Oil

WAREHOUSE STOCKS AVAILABLE

In The Following Cities

- Foundry Service Co. Birmingham, Alabama
- E. R. Frost Co. Minneapolis, Minnesota
- Hill & Griffith Chicago, Illinois
- Mike Puhek Detroit, Michigan
- William Holmes Tomkins Tidewater Terminal South Kearny, New Jersey
- Southwest Foundry Supply Co. Houston 7, Texas
- Malcolm G. Stevens Arlington, Mass.
- M. W. Warren Coke Co. St. Louis, Missouri
- Western Foundry Sand Co. Seattle, Washington
- Western Industrial Supply Co. Portland 14, Oregon

SMITH OIL & REFINING CO.

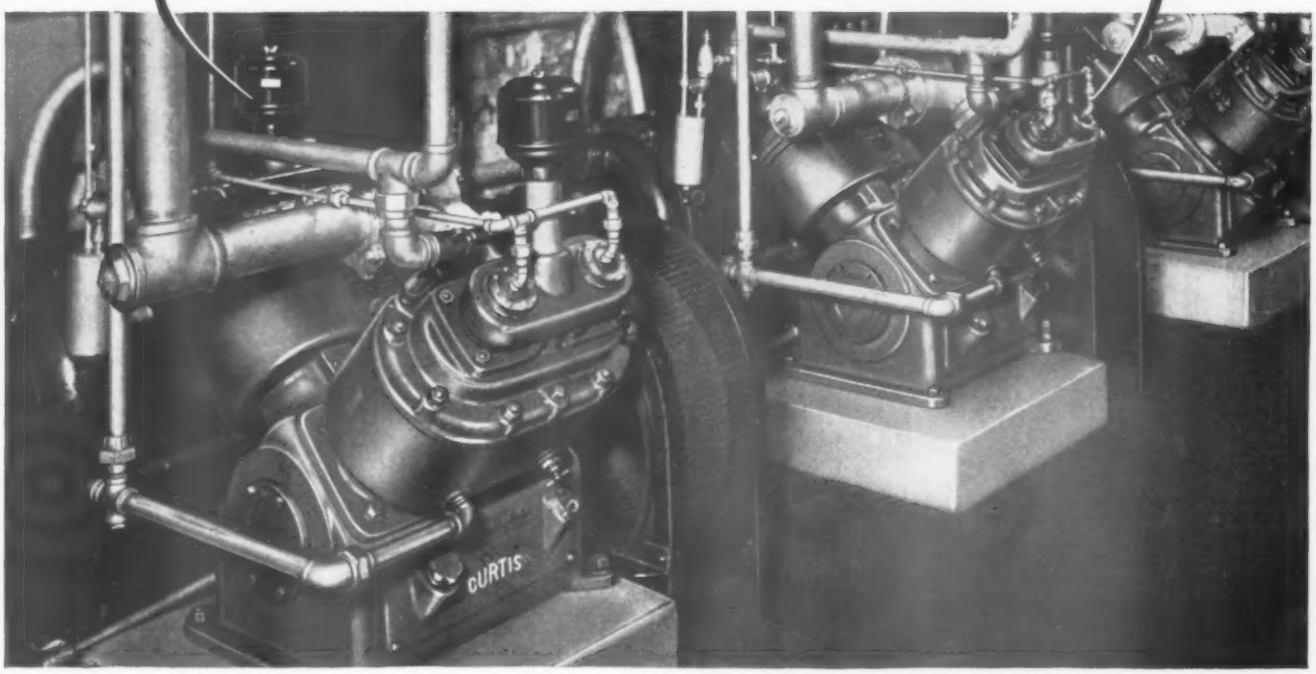
INDUSTRIAL OILS DIVISION . . . ROCKFORD, ILLINOIS

FOR AN ADEQUATE, DEPENDABLE AIR SUPPLY

Specify **CURTIS**

"PRECISION BUILT"

AIR COMPRESSORS



In thousands of plants throughout the country Curtis Model "C" Air Compressors are delivering a completely satisfactory air supply under widely varying conditions.

The precision construction of every Curtis Air Compressor assures dependable, trouble-free operation with less wear, unusually long life and low operating and maintenance costs.

Curtis economy results from such outstanding design features as:

- **Timken Roller Bearings**
- **Positive Lubrication — Self-oiling**
- **Carbon-free Disc Valves**
- **Automatic Pressure Unloader**
- **Precision Construction Throughout**

Curtis Air Compressors are available in sizes from ¼ to 50 H.P. Write today for full information or simply fill in the coupon below.

CURTIS PNEUMATIC MACHINERY DIVISION

of Curtis Manufacturing Company

ST. LOUIS • CHICAGO • NEW YORK • LOS ANGELES
OAKLAND, CALIF. • PORTLAND, ORE.

94 Years of Precision Manufacturing

CURTIS PNEUMATIC MACHINERY DIVISION — F 582
of Curtis Manufacturing Company
1922 Kienlen Avenue, St. Louis 20, Missouri

Please send me Form C-7 on Curtis Air Hoists, Air Cylinders and Curtis Air Compressors.

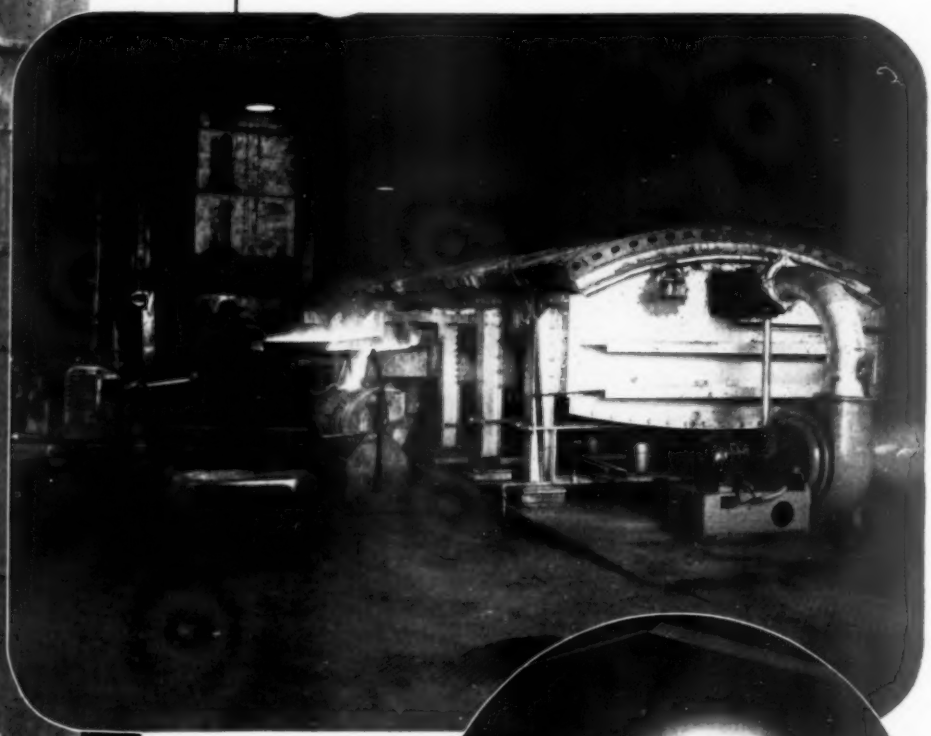
Name.....
Firm.....
Street.....
City.....*Zone*....*State*.....

for Hot

LET WHITING EXPERIENCE HELP

WHITING has no ax to grind. Whiting offers a complete line of successful melting equipment.

Whiting engineers are well versed in foundry melting economics . . . and the advantages and disadvantages inherent in every melting unit.



DUPLEXING

—combines the advantages of two or more melting units. Here the workman taps duplexed malleable iron from an air furnace.

WHITING CUPOLAS

—now melting more than 90% of the grey iron casting produced in the United States.

SIDE-BLOW CONVERTERS

—refine steel at low cost to any desired quality. Sulfur content can be effectively controlled.

Metal at Low Cost—

YOU SELECT EQUIPMENT BEST SUITED TO YOUR OPERATIONS

Whiting foundrymen have the practical experience necessary to analyze your particular problems and recommend the melting equipment that will bring the best results in your individual case. Over 60 years of experience are your assurance of capable service.

Knowing the wealth of information available through this organization, many of America's most successful foundries — small as well as large—bring their problems to be solved by Whiting engineers.

Can we help you?

ELECTRIC FURNACES

—with famous Hydro-Arc advantages . . . hydraulic electrode positioning and floor-operated electrode clamps. Photo shows a top charge model.

CRADLE FURNACES

—provide a constant supply of homogenous super-heated metal. Photo shows 10-ton size Cradle Furnace.

WHITING
CORPORATION

15607 Lathrop Avenue, Harvey, Illinois

Offices in Chicago, Cincinnati, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, St. Louis, and Agents in other principal cities. Canadian Subsidiary: Whiting Corporation (Canada) Ltd., Toronto, Ontario. Export Department: 30 Church Street, New York 7, N. Y.

New Aluminum Casting Alloy Replaces Malleable Iron
Federated Metals' "TENZALOY" Gives Heat-Treated Properties Without Heat Treatment
New York, June 1, 1948—The Simplex Boiler Stand Co. of Brooklyn has announced that in its plant, parts formerly produced of malleable iron are now being cast of Tenzaloy, the new Federated aluminum casting alloy. Other manufacturers are also turning to this new alloy for use in hardware, machine parts, etc.
Tenzaloy has physical properties such as those obtained from heat-treated alloys, but without the expense of heat treatment. This new aluminum-zinc-copper-magnesium alloy has high as-cast strength, excellent machinability and corrosion resistance, extreme whiteness, and superior polishing and plating characteristics. It requires no special foundry technique.
Tenzaloy can be cast in sand, permanent, or plaster molds.
The plant, which had a peace-time of 20,000 employees is now comm
with a skeleto
proach its former size. The first ship
from the plant, which primarily pre

JMLee FEI f

Industry needed a new aluminum casting alloy with special, hard-to-get physical characteristics.

Federated research metallurgists met the challenge . . . developed and perfected TENZALOY.

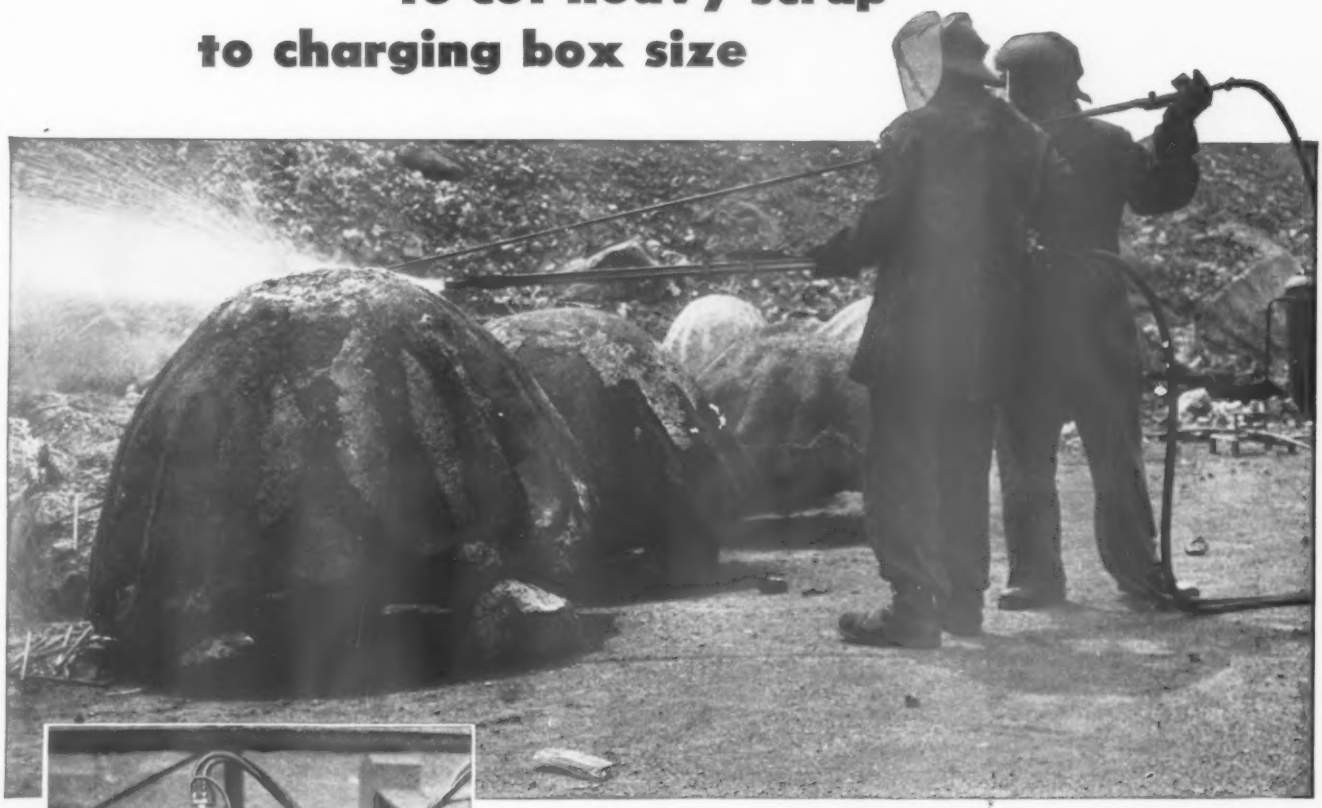
You can get TENZALOY ingot now! For pamphlet giving details, property tables and charts, clip this page, attach it to your letterhead and mail it in to Federated immediately.

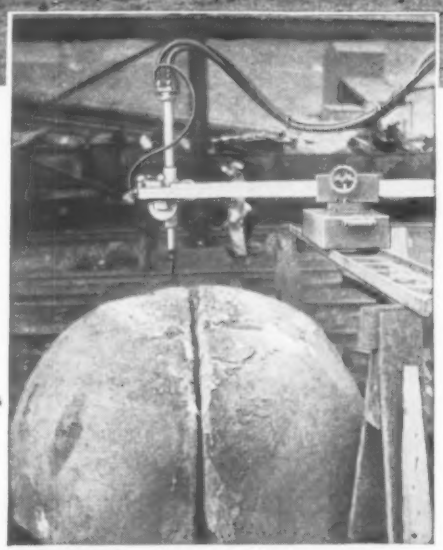
Federated first in the non-ferrous field FMD

Federated METALS

Division of American Smelting and Refining Company, 120 Broadway, New York 5, N. Y.

Here are THREE economical ways to cut heavy scrap to charging box size





Today, Airco offers steel men three outstanding oxyacetylene cutting methods that permit easy and economical handling of heavy scrap. Practically any heavy scrapping job falls within their scope . . . regardless of size, shape or location.

1. ***The oxyacetylene torch, plus the oxygen lance*** **. . . The illustration above shows them being used to scrap a heavy button . . . work progresses efficiently without initial handling since chunks can be cut to size in any position.**
2. ***Machine gas cutting*** **. . . This is ideal where crane facilities are available. The setup requires a heavy duty cutting torch on an Airco No. 40 Radiagraph. The two typical skulls shown in fig. 2 were sliced in two in 45 minutes each.**
3. ***The oxygen lance*** **. . . Capable of cutting extremely large sections. In fig. 3 the lance is being used to cut a 75-ton open hearth spill.**

This is another example of the manner in which modern Airco oxyacetylene equipment is helping progressive operators slash time and costs.

Ask to have an Airco Technical Sales Division representative call to supply further information. Address: Dept. 7586, Air Reduction, 60 East 42nd St., New York 17, N. Y. In Texas: Magnolia Airco Gas Products Company, Houston 1, Texas.

AIRCO **AIR REDUCTION**

Offices in All Principal Cities

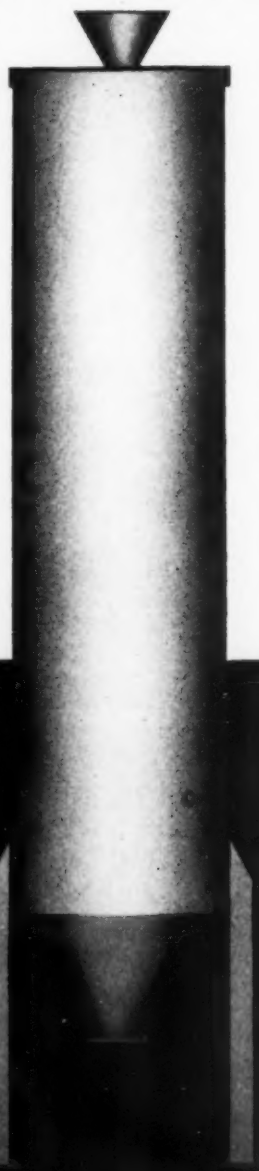
Headquarters for Oxygen, Acetylene and other gases . . . Carbide . . . Gas Welding and Cutting Apparatus and Supplies . . . Arc Welders, Electrodes and Accessories

Nerco Tower Dryers

Something Better in Foundry Sand Drying

A better dryer for core sand that brings to foundries many advantages over existing equipment including lower installation and operational costs. Dry sand offers close moisture control in mixing . . . . uniform distribution of binders . . . . elimination of freezing problems during winter months . . . . The dryer requires little floor space . . . . has no moving parts or motor drives to lubricate, maintain or replace . . . . Relieves core blowing of many costly difficulties . . . . Nerco Tower Dryers are something better in foundry sand drying . . . .

Nerco engineers are always available to give you the complete story—no obligation, of course. You'll like this Nerco story. Your letter will bring it to you.



NERCO TOWER DRYER DESIGN AND OPERATION ADVANTAGES

1—LOW COST . . . Simplicity in design makes the Nerco Tower Dryer available for large and small plants at a low initial investment.

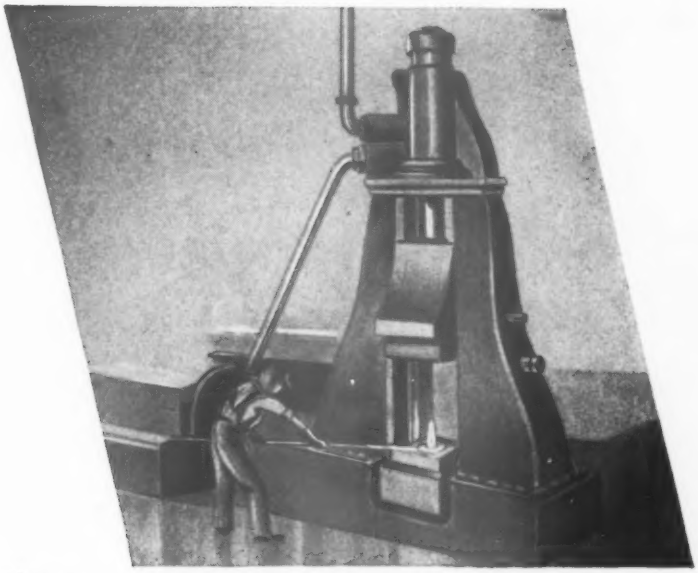
2—LOW MAINTENANCE . . . . . Operating and maintenance costs are held to a minimum with the use of a Nerco Tower Dryer with no moving parts or motor drive to lubricate, maintain or replace.

3—SAVING IN FLOOR SPACE . . . In the crowded plant, the saving in floor space of the Nerco Vertical Tower Dryer is most important. Little space is required.

NICHOLS ENGINEERING & RESEARCH CORP.

60 WALL TOWER • NEW YORK 5, N. Y.

In Canada: University Tower Bldg., Montreal.



High Temperature Lubrication... 400° F. and UP!

Oil simply burns up when used to lubricate deep-impression forging dies. However, in the case of a midwest forge company a **"dag"** colloidal graphite dispersion produced a successful lubricant and a sharp reduction in costs.

If you have equipment operating at high temperatures, consult Acheson Colloids' engineers. They can probably make money-saving recommendations. Let them try . . . let them know your lubrication problem today. Check the coupon and mail with your name and address.

Acheson Colloids Corporation, Port Huron, Michigan; Boston; New York; Philadelphia; Pittsburgh; Cleveland; Detroit; Chicago; St. Louis; Los Angeles; San Francisco; Toronto.

Send us booklet on:

- ☐ General lubrication
- ☐ Extreme (high or low) temperature lubrication
- ☐ Parting
- ☐ Impregnation
- ☐ Electronic applications
- ☐ Opaquing

FF 14

Acheson Colloids Corporation

PORT HURON, MICHIGAN

40th Anniversary Year

dag
REG U.S. PAT OFF
COLLOIDS

PATTERN JOBBERS AND FOUNDRYMEN

Rent Pressure Casting Equipment

ON LOW MONTHLY RENTAL RATES. WE CAN FURNISH FOR INSTALLATION IN YOUR PLANT, A COMPLETE UNIT OF PRESSURE CASTING EQUIPMENT. THIS EQUIPMENT IS DESIGNED FOR CONCRETE OR UPPER WOOD FLOOR INSTALLATIONS, REQUIRING LESS THAN 18 x 20 FEET OF FLOOR SPACE.

MAKE YOUR OWN PRESSURE CAST ALUMINUM MATCHPLATES, COPE & DRAG PLATES, CORE BOXES, LOOSE PATTERNS, FLAT PLATES, DRIER PATTERNS and other precision and experimental PRESSURE CASTINGS IN PLASTER MOLDS.

SAVE THE TWO-WAY WASTE IN TRANSPORTATION TIME, TO AND FROM MATCHPLATE VENDORS, AND GIVE YOUR CUSTOMERS FAST, EFFICIENT TWO DAYS TO ONE WEEK SERVICE, THAT HE WANTS.

CAPACITY OF OUR RENTAL UNIT IS (50) MATCHPLATES PER MONTH, OR, THE EQUIVALENT IN CORE BOXES OR OTHER PRESSURE CASTINGS, UP TO 18" x 24" FLASK SIZE.

LOW COST OF RENTAL WILL MAKE THE UNIT PROFITABLE TO YOU, IF YOU MAKE OR USE AS FEW AS (6) MATCHPLATES OR THE EQUIVALENT IN CORE BOXES OR OTHER TYPES OF ALUMINUM PATTERN EQUIPMENT PER MONTH.

PRESSURE CASTING TECHNIQUE WILL BE FURNISHED COMPLETE TO ALL OUR LESSEES OF RENTAL UNITS, INCLUDING PERSONAL INSTRUCTIONS IF DESIRED. APPRENTICES OR SAND MOLDERS CAN PRODUCE PRESSURE CASTINGS QUICKLY WITH OUR ASSISTANCE.

PROSPECTIVE LESSEES ARE INVITED TO VISIT OUR DETROIT PLANT TO SEE ONE OF OUR RENTAL UNITS SET UP.

ALL MATERIAL SOURCES WILL BE SUPPLIED BY US WITHOUT OBLIGATION.

WE GUARANTEE SATISFACTORY PERFORMANCE OF OUR RENTAL EQUIPMENT, OUR TRAINING SERVICE, COOPERATION, AND, A COMPLETE, PRACTICAL SET UP.

PRESSURE CAST PRODUCTS CORPORATION

1030 VERMONT AVENUE DETROIT 16, MICH. Tel. TAshmoo 5-8188

AFFILIATED PLANT LOCATIONS:

Birmingham, Ala.	Coffeyville, Kan.	Menasha, Wis.	Ottumwa, Iowa
821 N. 21st St.	1502 W. 8th St.	220 Washington St.	207 S. Sheridan

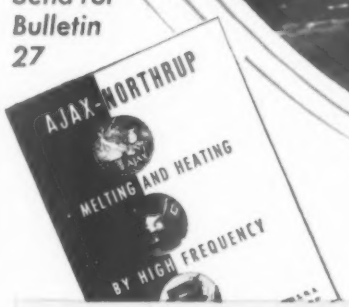
THE FURNACE THAT KEEPS PRODUCTION *spinning*

Centrifugal casting, because it eliminates machining, reduces rejects, and improves physical properties of metals, is a vital new process. And Ajax-Northrup high-frequency melting is vital to successful centrifugal casting.

The Ajax-Northrup furnace melts in minutes—no chance for contamination or oxidation. Uniform alloys—it stirs as it melts. Exact pouring temperatures. Excellent scrap recovery.

Capacities from 8 oz. to 50 lbs. with converter power source, and from 10 lbs. to several tons with motor-generator power source. Linings to suit all alloys, and furnaces are easily interchangeable for handling a variety. Write Ajax for more facts.

Send for Bulletin 27



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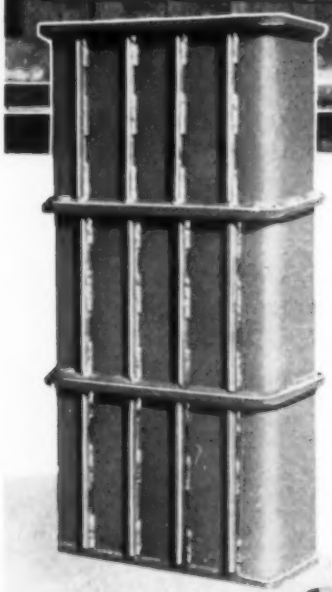
AJAX NORTHRUP
SINCE 1916

AJAX ELECTROTHERMIC CORP.
AJAX PARK, TRENTON 5, N. J.

ASSOCIATE COMPANIES
AJAX METAL COMPANY • AJAX ELECTRIC CO., INC.
AJAX ELECTRIC FURNACE CORP. • AJAX ENGINEERING CORP.

HIGH-FREQUENCY HEATING-MELTING

'Pressed Steel' Annealing Boxes Cut Furnace Space Requirements



Sheet alloy annealing boxes furnished to size. Complete line of heat-treating equipment for foundry and steel mill. Welded alloy tubing to specifications.

Here is a practical way to expand foundry production without the expense of building. Take the case of a well-known malleable foundry. The battery of furnaces was completely equipped with 'Pressed Steel' sheet alloy annealing boxes. In each furnace 22 stands of our boxes, as pictured above, replaced 18 stands of cast boxes. The result, 100% increase in furnace output due to the space saving of these less bulky units.

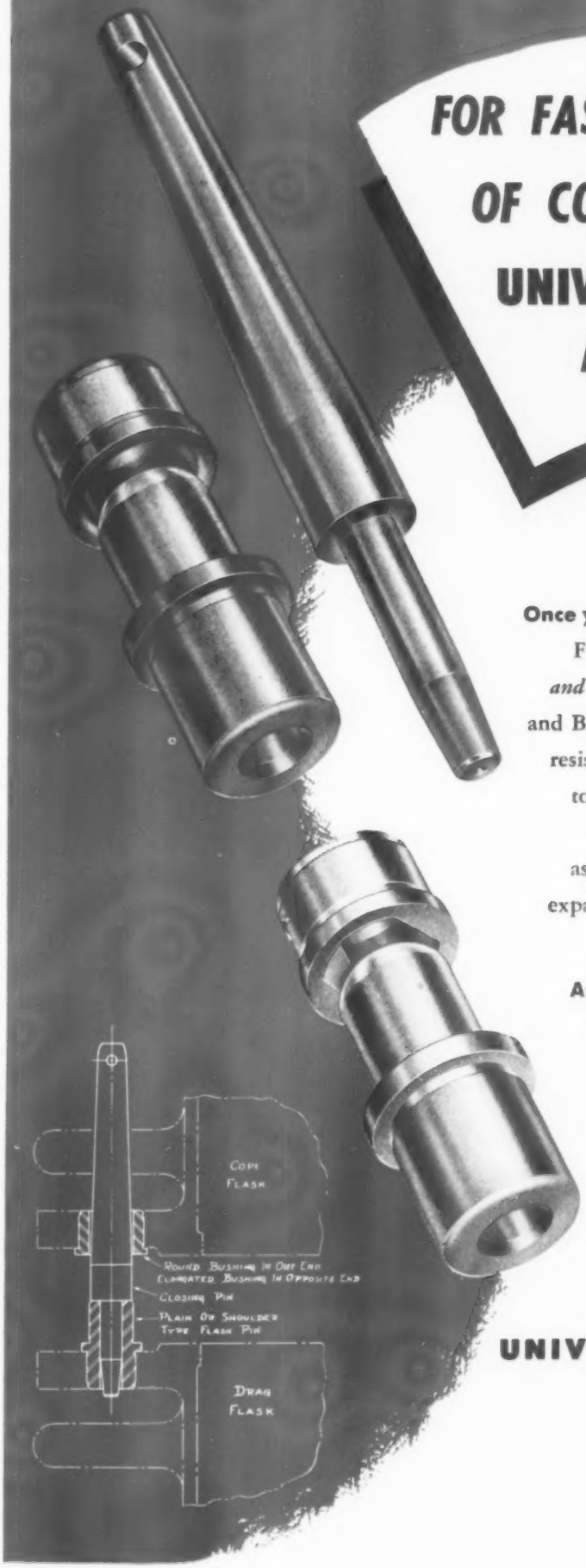
Plant records show these other substantial economies: 1) Fuel Saving--require less fuel and time to attain pot heat because of their light gauge; 2) Labor Saving--handle easier and faster; 3) Replacement Saving--installations in constant service for 10 years. Similar boxes for continuous malleablizing are standard in many of the nation's foundries. Send us blue-prints or write as to your needs.

THE PRESSED STEEL COMPANY
of WILKES-BARRE, PENNSYLVANIA

Industrial Equipment of Heat and Corrosion Resistant WEIGHT-SAVING *Sheet Alloys*

☆ ☆ ☆ OFFICES IN PRINCIPAL CITIES ☆ ☆ ☆

FOR FAST, ACCURATE LINE-UP OF COPE AND DRAG, USE UNIVERSAL FLASK PINS AND BUSHINGS



Once you install Universal precision made Standardized Flask Pins and Bushings *you can forget about cope and drag alignment troubles.* Universal Flask Pins and Bushings are hardened and ground for maximum resistance to wear. Cope Bushings are quickly guided to the Drag Pins over tapered, loose-fitting closing pins which are easily removed after assembly. Special design permits longitudinal expansion to compensate for metal heat, *without affecting accurate alignment.*

Available for immediate delivery in several sizes of round, elongated, press fit and taper types for use in cast iron, steel, aluminum, and magnesium flasks. *Special types and sizes to order.* Write for complete information.

UNIVERSAL ENGINEERING COMPANY

FRANKENMUTH 4, MICHIGAN

*

LESS "DOWN-TIME"

MORE PRODUCTION TIME

SWINDELL

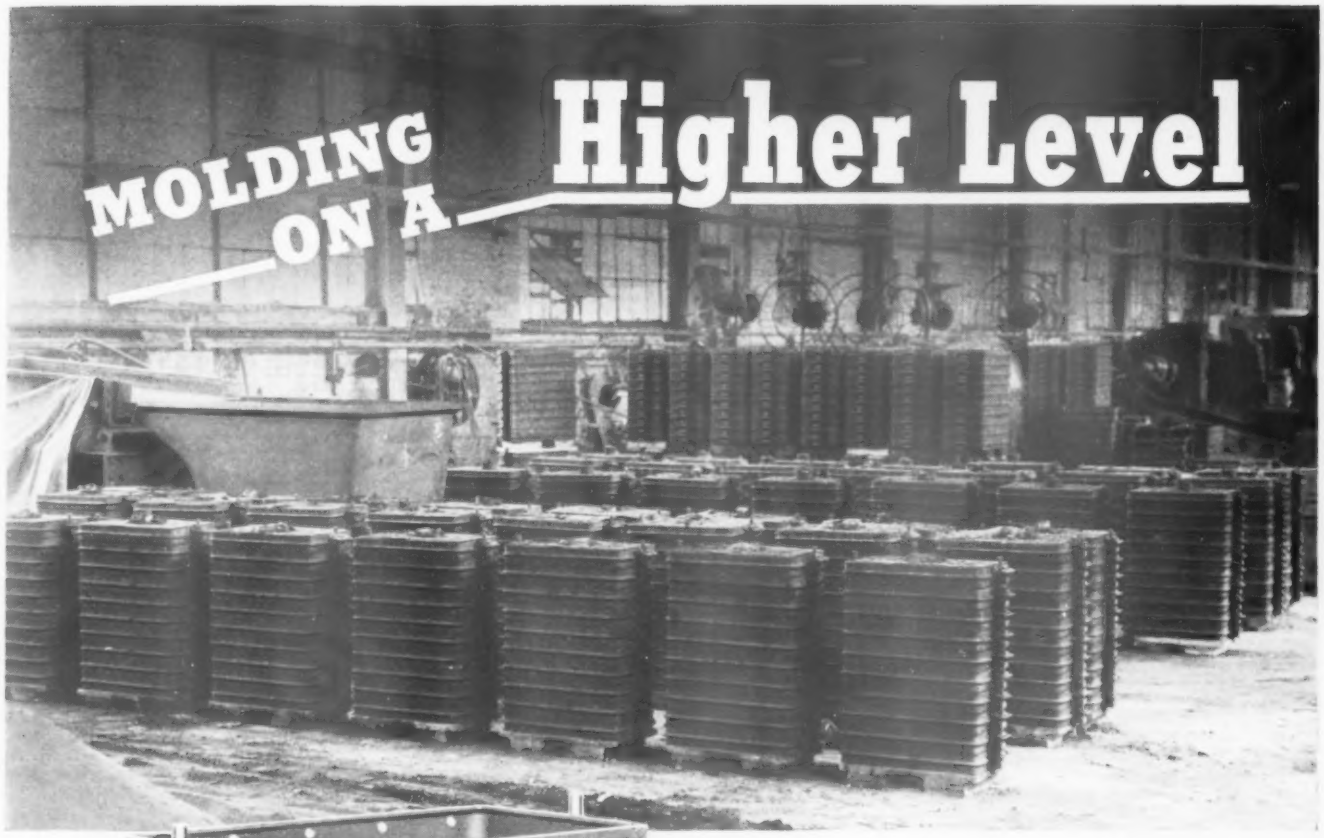
ELECTRIC ARC
MELTING FURNACES

*Have a SWINDELL engineer give you the facts.

SWINDELL-DRESSLER Corporation

DESIGNERS AND BUILDERS OF MODERN INDUSTRIAL FURNACES

PITTSBURGH 30, PA.



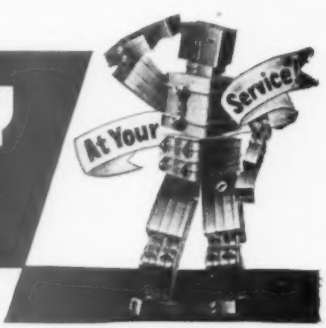
● Groups of 10 Sterling flask sections used for stack-molding in a Midwest Foundry.

WITH Sterling STACK-MOLDING FLASKS

Now — you can increase your foundry production 100% or more on certain types of castings by stack-molding with Sterling Steel Flasks. Molds are made in Flask sections stacked one above another, to a height of 10 or 12 sections, depending upon the depth.

Sterling steel flasks are tailor-made for stack molding operations. They easily withstand the terrific pressure used by high-speed molding machines. For faster, more efficient molding on a higher level, use Sterling special rolled steel flasks.

Sterling FOUNDRY FLASKS



STERLING WHEELBARROW COMPANY • Milwaukee 14, Wis., U.S.A.

A 5264-1P

3rd in a Series of

NEW SCHNEIBLE DEVELOPMENTS for Foundries

The Compensating

IT DOES THREE THINGS:

1. Introduces compensating air from outside of building.
2. Exhausts dust to Schneible Multi-Wash Collector.
3. Exhausts smoke and gas to outside of building.

Fractionating Uni-Flo Side Hood

Standard Schneible Uni-Flo Side Hoods are now available with *Compensating* and *Fractionating* features.

Compensating air (from outside of building) furnishes up to 75% of the air required to carry off smoke, heat and dust.

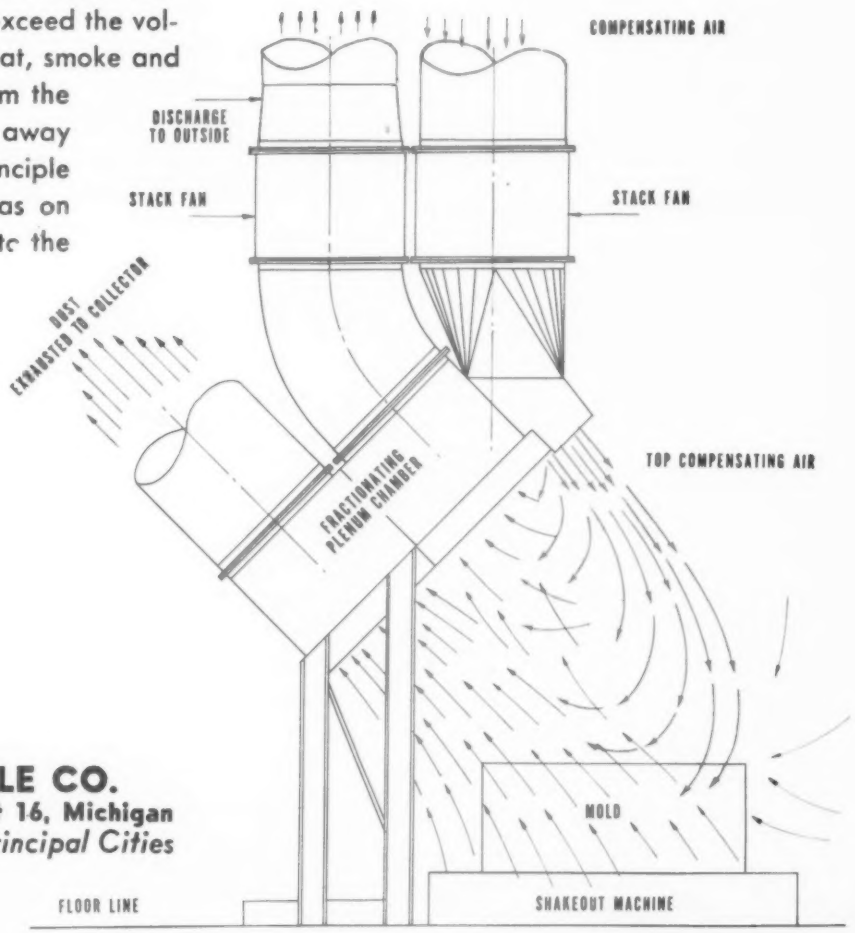
The Fractionating feature provides for a division of the total air being handled, so that it is only necessary to send 50% of the total air to a Multi-Wash Collector, the other 50% being clean enough to be discharged above the roof line.

Prescribed code face velocities for side hood ventilation establishes air volumes that exceed the volume necessary to carry away the heat, smoke and dust. The excess is necessary to form the air flow pattern to prevent leakage away from the hood. Our fractionating principle permits us to separate the two areas on the hood face, one area connected to the dust collector and the other vented outside the building. The resulting gain is the reduction in cost of the dust collecting equipment.

The combination of these two features offers a reduction in dust collector cost and a lowering of heating costs.

Get complete information on Schneible Multi-Wash Dust Collecting and Ventilation Systems for Foundries.

(U. S. and Foreign Patents Applied for)



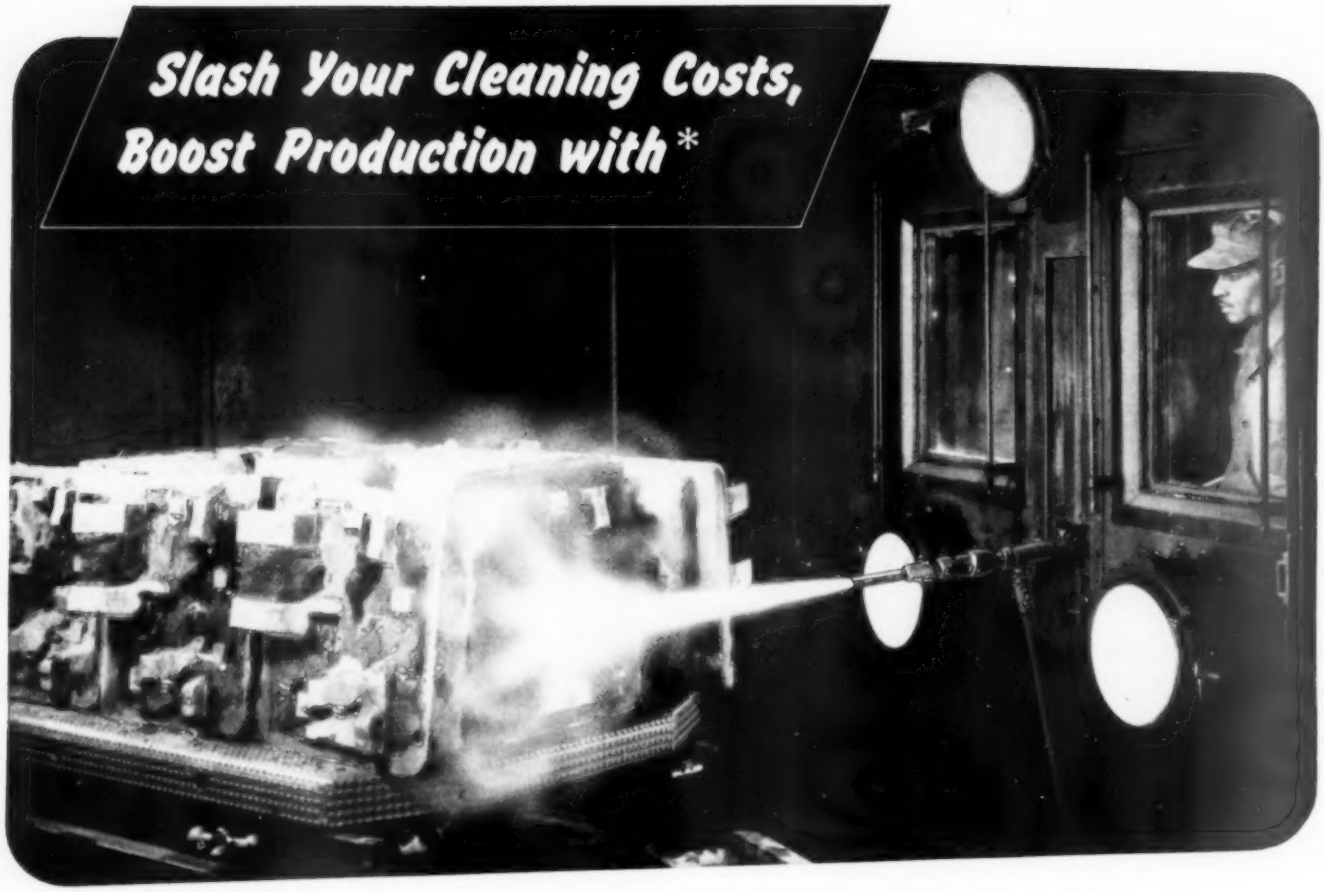
MANUFACTURER'S ASSOCIATION INC. FOUNDRY EQUIPMENT

CLAUDE B. SCHNEIBLE CO.
2827 Twenty-Fifth St. • Detroit 16, Michigan
Engineering Representatives in Principal Cities

SCHNEIBLE

LIQUID-VAPOR INTIMATE CONTACT EQUIPMENT for DUST COLLECTION ABSORPTION CONDENSATION AND TEMPERATURE REDUCTION

*Slash Your Cleaning Costs, Boost Production with**



*Pangborn Hydro-Sand Blast and Core Knockout

Here's How . . .

- Saves time, labor, material.
- Core knockout and cleaning done by one man in one operation.
- Work done in self-contained steel plate room while operator stands outside.
- Handling time cut to minimum.
- Complete recovery of sand and core rods.
- Total elimation of dust.
- Roughing and chipping costs reduced.
- Custom-Engineered to your individual requirements.

Look to Pangborn for the Latest Developments in Blast Cleaning and Dust Control Equipment.

IN ONE OPERATION, Pangborn Hydro-Sand Blast and Core Knockout makes an economical, clean, easy, safe job of core removal and sand blasting of large, medium and small castings.

WITH MAN POWER AT A MINIMUM, this new, modern installation propels a high-velocity stream of sand and water that blasts, cuts and cleans, eliminating dirt and dust . . . a cleaning room that "keeps itself clean."

CORE SAND IS RECLAIMED AND CORE RODS REMOVED *without sledge damage* with the Pangborn Hydro-Sand Blast and Core Knockout. This installation also makes subsequent chipping and finishing jobs cleaner, more economical, for it cleans quickly and thoroughly as the work rotates on its controllable table.

For complete information on the profit-saving Pangborn Hydro-Sand Blast and Core Knockout, write for free Bulletin No. 1100, PANGBORN CORPORATION, 1400 PANGBORN BLVD., HAGERSTOWN, MARYLAND.

Pangborn

BLAST CLEANS CHEAPER with the right equipment for every job

CHEMICAL USERS' GUIDE To General Chemical Products for the Metal Industries

PRODUCT	AVAILABLE FORMS	COMMERCIAL STRENGTHS	SHIPPING CONTAINERS	APPLICATIONS
Sulfuric Acid H_2SO_4	Liquid	66° Be (93.19%) 99% Oleum, 20-65%	Carboys (except Oleum) Steel Drums Tank Trucks Tank Transports Tank Cars	Pickling and descaling; electroplating; bright dipping; electrolytic polishing; galvanizing; anodizing.
Hydrochloric Acid HCl + water *(Muriatic Acid)*	Liquid	18° Be (27.92%) 20° Be (31.45%)	Carboys Tank Trucks Tank Cars	Pickling; electroplating; bright dipping; galvanizing; tinning; etching metals; dissolving metals.
Nitric Acid HNO_3 + water	Liquid	36° Be (52.30%) 38° Be (56.52%) 40° Be (61.38%) 42° Be (67.18%) 95%	Carboys (except 95%) Drums Tank Cars	Pickling; electroplating; bright dipping; oxide finishing; dissolving and stripping metals.
Hydrofluoric Acid HF + water	Liquid	30% 60% 48% 70% 52% 80%	Rubber Drums (except 60%) Steel Drums & Tank Cars (60% only)	Pickling; electroplating; electrolytic polishing; bright dipping.
Sodium Fluoride NaF	White Powder	90 or 95% Light or Dense	Fibre Drums	Manufacture of rimmed steel; heat treating; galvanizing; pickling; electroplating.
Sodium Bifluoride $NaHF_2$	White Powder	90%	Fibre Drums	Electroplating.
Trisodium Phosphate $Na_3PO_4 \cdot 12H_2O$ *(TSP)*	Crystal	P_2O_5—18.4%	Multiwall Paper Bags Fibre Drums	Alkali cleaning.
Sodium Metasilicate $Na_2SiO_3 \cdot 5H_2O$	White Granules	98.5%	Multiwall Paper Bags Fibre Drums	Alkali cleaning.
Oxalic Acid $C_2H_2O_4 \cdot 2H_2O$	Colorless Crystals	99.5%	Fibre Drums	Oxide finishing; metal cleaning.
Potassium Fluoborate KBF_4	White Powder	97.0%	Fibre Drums	Aluminum and magnesium casting; as a flux and grain refiner for aluminum; for removing magnesium from secondary aluminum alloys.
Sodium Fluoborate $NaBF_4$	White Powder	94.0%	Fibre Drums	
Ammonium Fluoborate NH_4BF_4	White Powder	96.0%	Fibre Drums	Aluminum and magnesium casting; electroplating.
Fluoboric Acid HBF_4 + water	Liquid	42.0%	Rubber Drums	Electroplating; metal cleaning or dipping.
Lead Fluoborate $Pb(BF_4)_2$ + water	Liquid	51.0%	Carboys	Electroplating.
Tin Fluoborate $Sn(BF_4)_2$ + water	Liquid	46.0%	Rubber Drums	Electroplating.
Zinc Fluoborate $Zn(BF_4)_2$ + water	Liquid	49.0%	Rubber Drums	Electroplating; bonderizing aluminum.
Copper Fluoborate $Cu(BF_4)_2$ + water	Liquid	44.0%	Carboys	Electroplating.

BASIC CHEMICALS

FOR AMERICAN INDUSTRY

The products advertised are commercial chemicals having various uses, some of which may be covered by patents, and the user must accept full responsibility for compliance therewith.

OTHER PRODUCTS: Acetic Acid; Ammonium Thiosulfate Solution; Aqua Ammonia; Barium Fluoride; Chromium Fluoride; Copper Fluoride; Copper Sulfate; Glauber's Salt; Iron Sulfide; Nickel Fluoride; Perchloric Acid; Sodium Bisulfite, Anhydrous; Sodium Silicate; Sodium Sulfite, Anhydrous; Stannous Chloride; Sulfur; Tetrasodium Pyrophosphate.

GENERAL CHEMICAL DIVISION

ALLIED CHEMICAL & DYE CORPORATION

40 RECTOR STREET, NEW YORK 6, N. Y.

Offices: Albany • Atlanta • Baltimore • Birmingham • Boston • Bridgeport • Buffalo • Charlotte • Chicago Cleveland • Denver • Detroit • Houston • Kansas City • Los Angeles • Minneapolis • New York Philadelphia • Pittsburgh • Portland (Ore.) • Providence • San Francisco • Seattle • St. Louis Wenatchee and Yakima (Wash.)

In Wisconsin: General Chemical Company, Inc., Milwaukee, Wis.

In Canada: The Nichols Chemical Company, Limited • Montreal • Toronto • Vancouver

FREEMAN *Dowmetal* PATTERN PLATES

All Plates Shipped Same Day Order is Received

TRY THEM FOR COPE AND DRAG MOUNTINGS

Many foundries are already using FREEMAN PATTERN PLATES as they are LIGHTER, STRONGER and IMMEDIATELY AVAILABLE in ANY SIZE AND QUANTITY. Surfaces are held to CLOSE PARALLEL TOLERANCES and plates are of UNIFORM THICKNESS.

With their clean VELVET FINISH, plates are received in proper condition for mounting patterns. Drilling, tapping and NECESSARY MACHINING to mount patterns is DONE MORE EASILY on free-cutting DOWMETAL PATTERN PLATES.

For regular pattern or cope and drag work, we can furnish ANY PRACTICAL SIZE 5/16"—3/8"—1/2"—5/8"—3/4"—1" THICKNESS. When ordered by flask size, we allow 1" for flask and 2-1/2" on each end for pins and ears. If square or rectangular plates are desired, specify overall size and thick ness. For special shapes send a template or sketch. LITERATURE AND PRICE LIST AVAILABLE

THE FREEMAN SUPPLY CO.

Pattern Shop and Foundry Supplies and Equipment

Mahogany and Pine Pattern Lumber

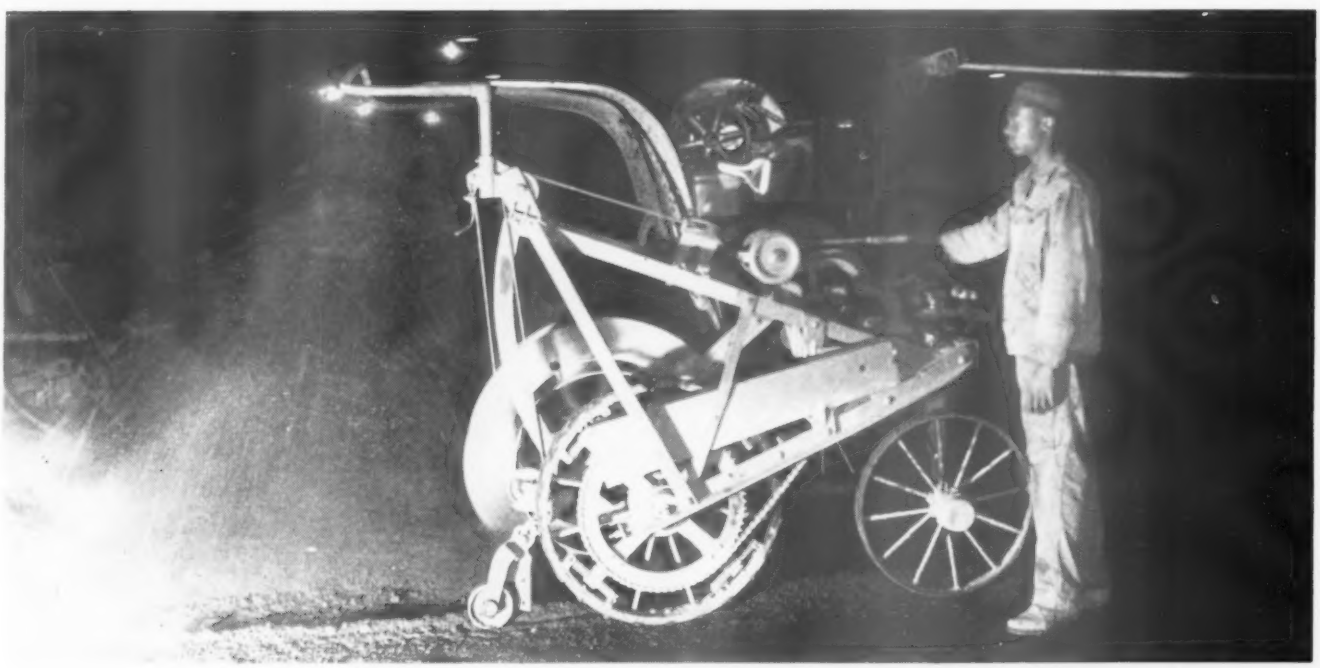
1152 E. BROADWAY TOLEDO 5, OHIO

when are five men better than ten?

That's easy. Five men are better than ten when they can accomplish more work in a given period of time. And that is exactly what happened at the American Foundry and Castings Co., Inc. when they purchased a Sandcutter. Where originally 10 to 11 men were required on the night-shake-out crew, today, with a Sandcutter, only five men are needed to condition the sand . . . and they do it in far less time.

Absenteeism was formerly a serious condition with the night crew. By eliminating the "back breaking labor of continuous shoveling", Sandcutter disposed of their absentee problem. Another problem of poorly conditioned sand was easily solved by the Sandcutter, as its whirling blades thoroughly mixed and aerated the sand to make it loose, soft, fluffy and cool.

Maintenance costs, too, took a big drop with the purchase of the Sandcutter. According to Mr. Harvey Cross of this concern, replacement parts were always on order for their former sand conditioning machine. Since installing the Sandcutter they have not yet ordered a single replacement part. The Sandcutter can increase the productivity of your men. Write today for details.



Shown above is the Model "AA" Sandcutter being used at the American Foundry and Castings Co., Inc., Jersey City, N. J.

WRITE FOR COMPLETE CATALOG

The "American Line" catalog illustrates and describes every Sandcutter model as well as all other American Products. Send for your free copy today.

American
WHEELABRATOR & EQUIPMENT CORP.
(FORMERLY AMERICAN FOUNDRY EQUIPMENT CO.)
505 S. Byrkit St., Mishawaka 2, Indiana

Sandcutters

THE NEW WESTINGHOUSE "65" FLEXARC

. . . a 65-volt Industrial A-c Welder, with Stabilized Arc

The new Westinghouse "65" Industrial A-c Welder is producing better, faster and cheaper in many fields of metal fabrication. Here two of them take their place in the automobile production line of the Hudson Motor Car Company, Detroit.

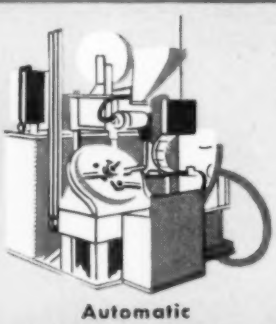
Built to operate with an open-circuit, secondary voltage of *only* 65 *volts* . . . with uniform, *continuous* current adjustment . . . the Flexarc "65" overcomes the problems of arc instability which formerly limited the use of lower a-c voltages for heavy-duty industrial welding.

Westinghouse

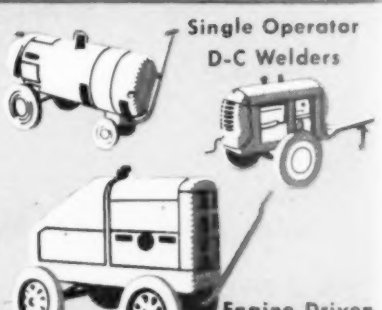
PLANTS IN 23 CITIES . . . OFFICES EVERYWHERE

Manual Type A-C Welders
HC, WC-AC, WT-4, Farm Welder

1000 Amp
A-C Welder



Automatic
Welding Equipment



Single Operator
D-C Welders

Engine-Driven
D-C Welders

Are you getting your share of

$21,600,000 SAVINGS PER YEAR

made possible by A-C welding?

4 out of every 5 welders in use today are d-c. Yet, actual operating figures prove that a-c welding is faster, cheaper and better.

It's time to forget old concepts of welding costs and efficiency—to reverse this ratio of a-c to d-c equipment in line with proved operating results. The potential savings are startling—conclusive evidence that you cannot afford to continue using d-c welding extensively.

SAVINGS IN WAGES—

Because a-c welding is 20% to 30% faster, permitting excellent welds at higher speeds on all classes of work, nearly $1,240,000 *monthly* can be saved in labor costs (at $1.50 per hour).

SAVINGS IN POWER—

Because a-c welding requires less power, giving 85% to 90% efficiency as against 55% to 65% for d-c machines, the potential *monthly* power saving is over $500,000 (at 2c per kilowatthour).

SAVINGS IN DEPRECIATION—

Because fewer a-c machines are required, potential savings of more than $18,800 per month can be realized (based on a capital charge of 1% per month).

SAVINGS IN MAINTENANCE—

Because a-c welders require less maintenance, potential monthly savings on maintenance total more than $60,000.

These add up to total monthly savings of more than $1,800,000, or $21,600,000 per year. These are "boxcar" figures, but they are backed up with facts.

A Westinghouse welding specialist is ready to give you these facts, and to show you actual dollars-and-cents savings possible in your plant by replacing d-c welders with modern a-c welding techniques and equipment.

Get in touch with your nearby Westinghouse office, and ask a welding sales engineer to call. Or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna. J-21449

EVERYTHING for Welding ANYTHING!

Portable and Bench-Type Brazers
High-Frequency Stabilizers
Electrodes, Brazing Alloys Arc Torch and Accessories
Resistance Welding Control

MAIL THIS COUPON

Westinghouse Electric Corporation
P. O. Box 868, Pittsburgh 30, Penna.

YES—send me details on the new Westinghouse "65" A-c Welder—also on items checked.

- ☐ Automatic Welding Equipment
- ☐ Engine-driven Welders
- ☐ HF Stabilizers
- ☐ Brazers
- ☐ Electrodes
- ☐ Resistance Welding Control
- ☐ D-C Welders

Name

Company

Address

Now...INTERNATIONAL OFFERS YOU A NEW COST CUTTING ADVANTAGE

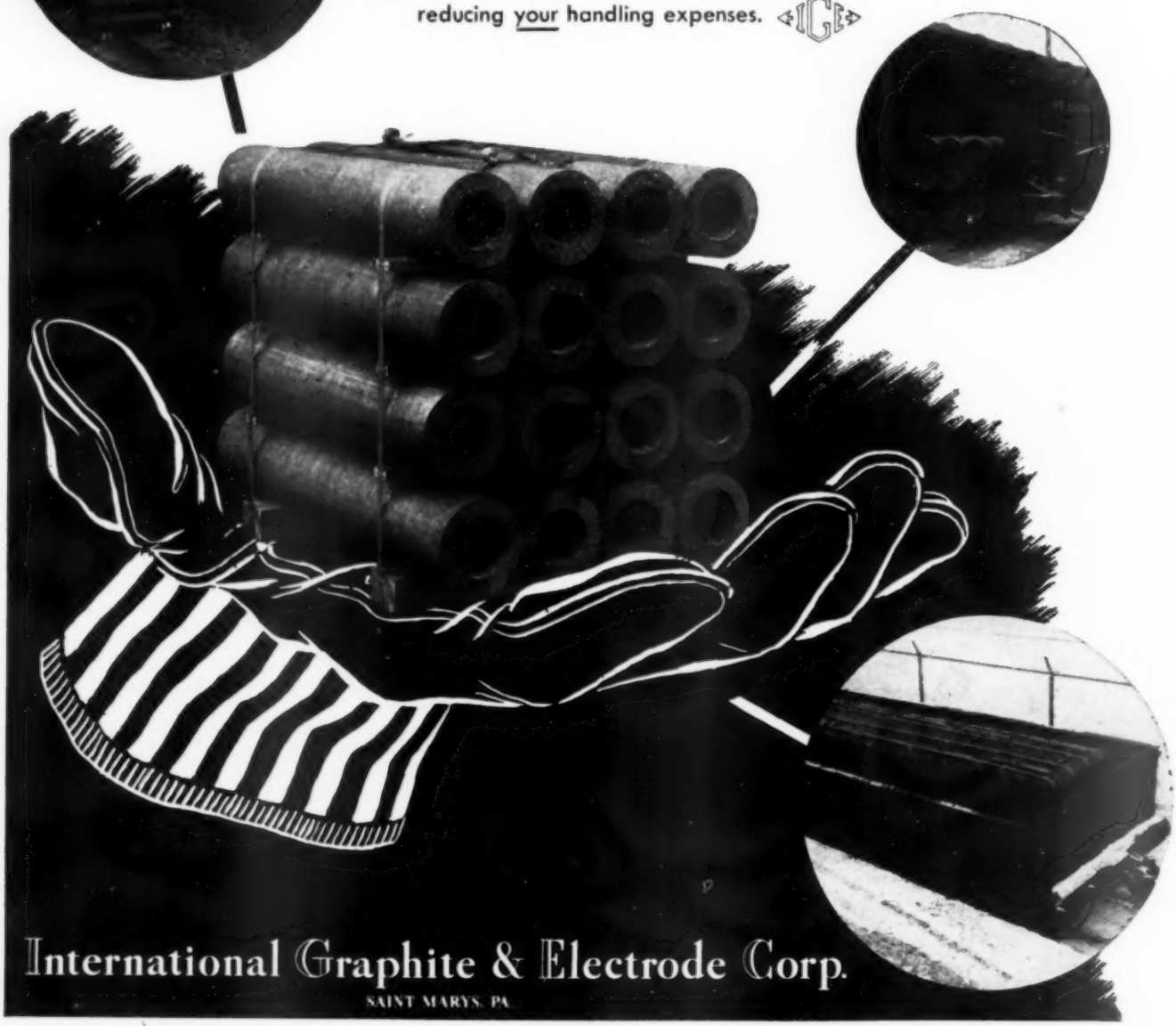
International's new method of shipping electrodes may reduce handling costs 90% or more.

Electrodes in sizes up to 14" x 60" are shipped as a bundle, held together by steel straps. In a matter of minutes these bundles are removed as units from boxcars and gondolas by crane or fork lift truck.

One user of International Graphite Electrodes, shipped this new way, reported unloading time reduced from 10 hours to 50 minutes! At another plant, reduced handling time resulted in a saving of almost $200.00 in one shipment.

This improved method of shipping electrodes eliminates the use of blocks and crowbars — prime causes of chipping and breakage during unloading.

Write today for information on how International can help you cut overall electrode costs, by reducing <u>your</u> handling expenses.



International Graphite & Electrode Corp.
SAINT MARYS, PA.

CLEAN at Low Cost

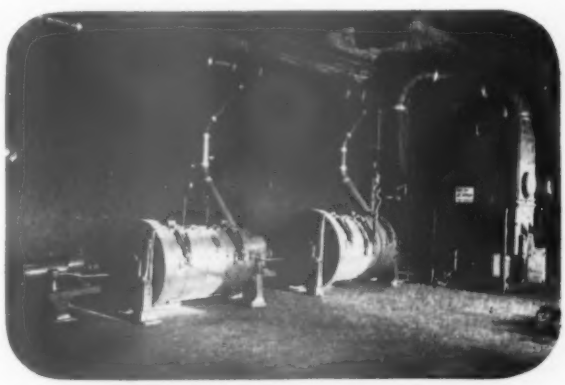
It pays to clean castings *clean.* It pays in the machine shop and, again, in the finishing room.

Whiting Tumbling Mills and Whiting Hydro-Blast Barrels offer two cleaning methods, both of which clean castings thoroughly. Both have the added advantage of low-cost, dependable operation.

TUMBLING MILLS
have a peening action on the castings, which reduces internal strains and provides a better surface for finishing. Bulletin FY-123.

HYDRO-BLAST BARRELS
clean brass and bronze castings with a high-pressure blast of sand and water . . . a method that is entirely dust-free and leaves a bright, satin-like surface. Bulletin FY-106.

Let Whiting help you to better, lower cost cleaning. Write for descriptive bulletins.



Offices in Chicago, Cincinnati, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, and St. Louis. Agents in other principal cities. Canadian Subsidiary: Whiting Corporation (Canada) Ltd., Toronto, Ontario. Export Department: 30 Church St., New York 7, N. Y.

WHITING
CORPORATION
15607 Lathrop Ave., Harvey, Illinois

A 1948 SERVICE STATION WITHOUT AIR would be like A 1948 FOUNDRY without

ROYER *Sand Conditioning* EQUIPMENT

PUT YOUR PLANT IN A POSITION TO COMPETE FOR NEW BUSINESS *with a Royer*

Model NB-2 in use at New York Air Brake Co., Watertown, N. Y. Capacity 7 to 9½ tons of sand per hour.

Remember, many a foundry profit is lost in wasteful, old fashioned, sand preparation. Hand blending and riddling in a modern foundry is as dated as a kerosene lamp.

Bring your sand conditioning up to 1948 standards with a Royer Sand Separator and Blender. A Royer automatically performs a complete *six-fold* operation for you:

1. Cleaning sand and removing trash and burnt cores
2. Combing sand and breaking up lumps and clay balls
3. Blending old sand with new sand and bond
4. Distributing moisture evenly throughout the mass
5. Aerating, cooling and de-gassing the mixture
6. Increasing permeability from 10 to 20 points

You cut your labor costs appreciably . . . because one man, with a Royer, can condition enough sand in a few minutes to keep a crew of molders busy for hours. All he does is shovel it in the hopper. The Royer does the rest. You make an additional profit on sand economies . . . and from turning out higher grade, smoother surfaced castings (with far fewer rejects due to runouts, scabs, drops, skids and other defects).

OVER 8000 ROYERS NOW IN USE

Royers have run up an amazing performance record. Many have been in service from 10 to 15 years and are still in there pitching every day. Over half of the Royers are repeat purchases from plants that Royer service has helped to expand.

Royers are available in sizes to meet all foundry needs . . . ranging from 4 to 50 tons per hour capacity . . . in portable and stationary models. Write for Bulletin 744.

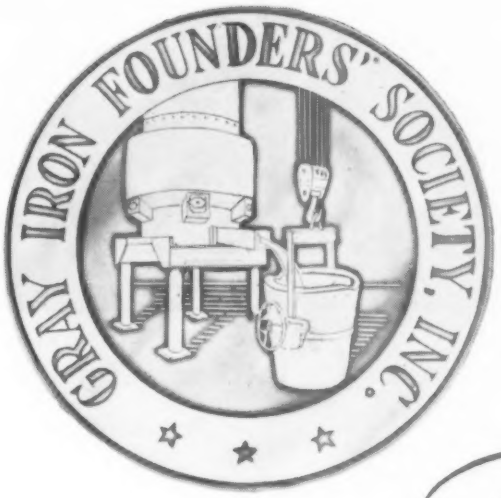
MANUFACTURERS' ASSOCIATION, INC. FOUNDRY EQUIPMENT

ROYER

FOREMOST IN SAND CONDITIONING EQUIPMENT

ROYER FOUNDRY & MACHINE CO.

159 PRINGLE ST., KINGSTON, PA.



THIS EMBLEM STANDS FOR *Progress*

Members of Gray Iron Founders' Society have taken a long, searching look at their industry—its problems and its opportunities. They find thrilling challenges in both.

To meet these challenges, a long-range program has been laid out, designed to enable member companies to serve their customers better and to extend the uses of gray iron products.

Important features of this program are:

1. Assistance to users and potential users of gray iron in making their products better, in lowering their costs, or both.
2. Consultation and service to help members improve their products and their processes.
3. Education—within the membership, in technical schools and throughout industry as a whole—on the uses and valuable engineering properties of gray iron components.

Gray Irons Provide These Advantages:

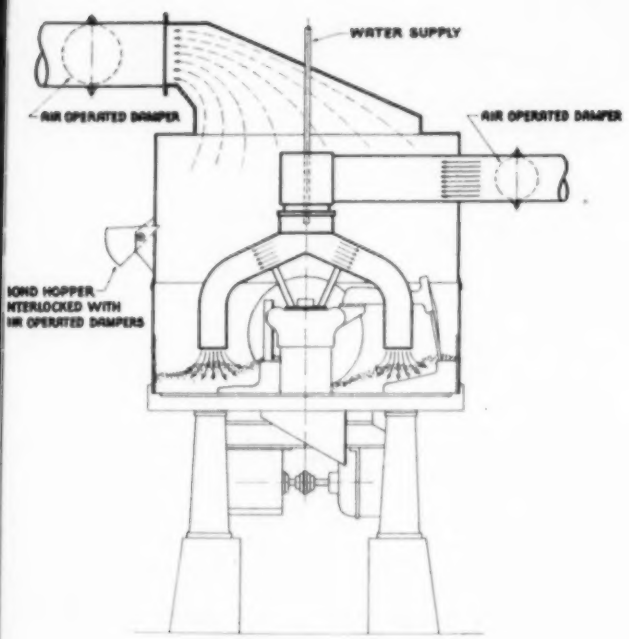
- Castability—dimensional accuracy
- Machinability
- Abrasion and wear resistance
- Corrosion resistance
- Rigidity
- Damping capacity
- Heat resistance
- Low notch sensitivity
- Durability
- Wide selection of mechanical properties

"Make It Better with Gray Iron"

GRAY IRON FOUNDERS' SOCIETY, INC. *33 PUBLIC SQUARE CLEVELAND 13, OHIO*

Problem { PROVIDE ADEQUATE COOLING OF HOT SAND TO IMPROVE MOLDABILITY AND REDUCE SCRAP

Solution { INSTALL NEW NATIONAL *ROTARY COOLING HOOD* ON EXISTING MIXER



HERE'S HOW IT WORKS:

(Above) The basic principle employed in the new Rotary Cooler is the proved mechanical principle of cooling through evaporation. Excess moisture is added to the sand, and air at high velocity is forced through the sand as it passes over the plows. As the moisture is evaporated, the heat in the sand is transferred to the vapor generated, and carried out of the mixer. A slight vacuum is maintained in the mixer to prevent dust laden air from escaping into the work area.

(Right) Typical installation of two Simpson Intensive Mixers equipped with cooling hoods, installed at a large foundry.

THE letter reproduced on the opposite page tells, accurately and concisely, the real story of the kind of performance you can expect from the new National Rotary Cooling Hood. Installed on any standard Simpson Mixer, this new high-capacity cooler provides complete control of sand temperatures throughout mixing cycles, even under the most extreme sand temperature conditions . . . As evidenced by Mr. Seelbach's statement that "sand . . . as it comes from the Simpson Mixer . . . is very close to room temperature at the molding stations . . ."

Let a National Engineer show you how the new Rotary Cooling Hood will help solve your hot sand problems. Call or write for details today.

Proof

THE
FOREST CITY FOUNDRIES Co.
Soft Light Gray Iron Castings
HIGH TEST SEMI STEEL CASTINGS
CLEVELAND 13, OHIO

WALWORTH RUN PLANT

October 29, 1947

National Engineering Company
549 West Washington Boulevard
Chicago, Illinois

Attention: Mr. Fred Fuller

Gentlemen:

We wish to express our satisfaction in regard to your recent efforts toward improving a hot sand condition in our foundry.

As a r... we... is now definitely cooler as ... eral ...es ... Simpson Mixer, and is very close to room perature at the molding stations. It is now pos- ible to control our sand more closely, particularly in regard to the moisture content. Formerly, the high temperature of the sand, after mixing, resulted in evaporation and change in the moisture content after it had left the mixer.

We feel that your new rotary design cooling dev... is simple and practical and we would like to ... feature incorporated in the cooling ... with you for our new sa... mit.

...ly,

FOREST CITY FOUNDRIES CO.

Charles Seelbach, Jr.

Charles F. Seelbach, Jr.
Plant Engineer

CFS:sn

NATIONAL ENGINEERING COMPANY
608 MACHINERY HALL BUILDING • CHICAGO 6, ILLINOIS

Manufacturers and Selling Agents for Continental European Countries—The George Fischer Steel & Iron Works, Schaffhausen, Switzerland. For the British Possessions, Excluding Canada and Australia—August's Limited, Halifax, England. For Canada—Dominion Engineering Co., Ltd., Montreal, Canada. For Australia and New Zealand—Gibson, Battle & Co., Pty., Ltd. Sydney, Australia

STANDARD AND SPECIAL EQUIPMENT

Ladles

Bowls...Shanks...Bails...Tongs

Complete pouring and handling equipment is available at *Industrial*.

The line includes patented Timken worm geared ladles. Unaffected by bowl or bail distortion, self-locking, continuous oil-bath lubricated.

Special equipment for almost any need can be supplied. Send blueprints, sketch, or specifications.

Write for latest catalog.

INDUSTRIAL EQUIPMENT CO.

115 N. OHIO ST.
MINSTER 1, OHIO

Paired for Production!

HOUGH SAY "HUFF" **PAYLOADER** PATENT 2,412,323

and

PAYLOADER PATENT 2,412,323 **BUGGY**

Here is a profitable pair of production boosters for long-haul materials handling in the foundry industry — the well known, widely used Model HA Payloader Shovel and the new Payloader Buggy. Shovel and Buggy are teammates in every respect . . . are matched in power, speed and operation and also have interchangeability of almost all parts — an important service-economy feature for users of both units.

The Payloader Buggy has a capacity of 2 cu. yd. or 5,000 lbs. . . . carries any bulk material, dumps easily by hydraulic power. Payloader Shovels and Buggies have low height, rear wheel steer, short turning radius, large easy-rolling wheels, powerful hydraulic brakes and are easy to operate. They will travel through narrow aisles and in congested, low head-room areas. Information on the Payloader Buggy or any and all sizes of Payloader Shovels will gladly be supplied on request, also the name of your Hough distributor who sells and services these profitable, production-boosting machines.

SEND TODAY for bulletins on the Model HA 10½ cu. ft. Payloader, the ¾ yd. Model HF, the 1¼ yd. Model HL, the 2 yd. Payloader Buggy.

THE FRANK G. HOUGH CO.

703 Sunnyside Avenue — Libertyville, Illinois

TRACTOR SHOVELS SINCE 1920

for

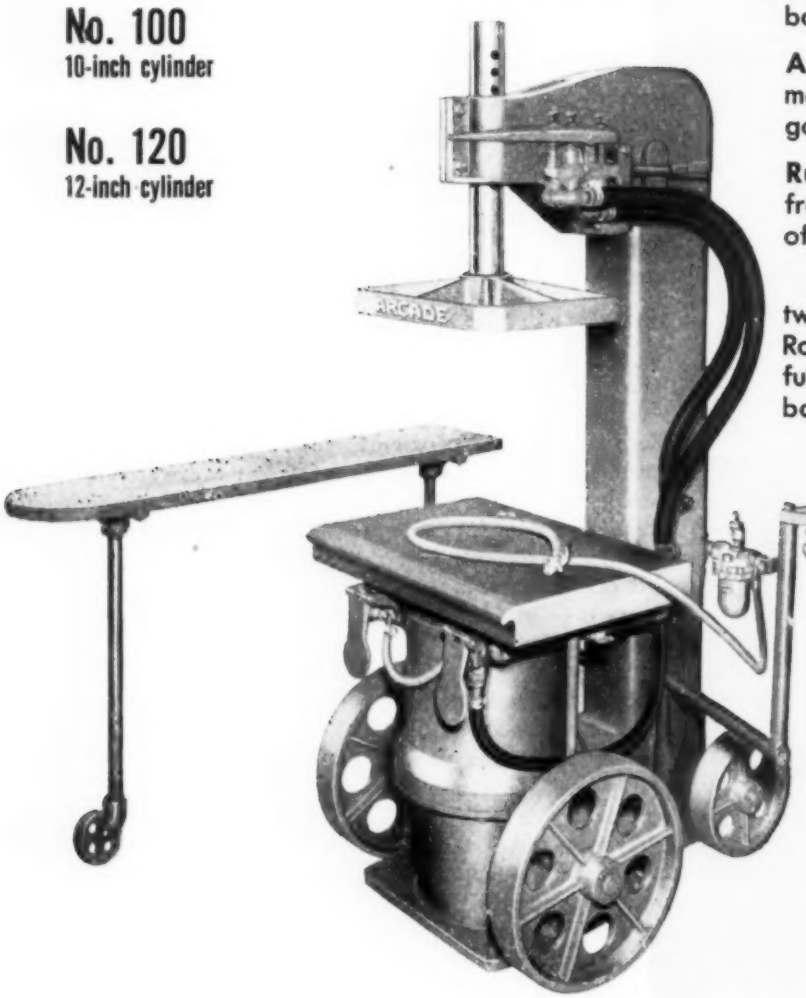
FAST, ACCURATE PRODUCTION

at low cost

ARCADE'S *New* JOLT SQUEEZER

No. 100
10-inch cylinder

No. 120
12-inch cylinder



Here is a molding machine with one clear purpose—to produce the maximum number of accurate molds at lowest possible cost.

Notice these revolutionary features:

Interchangeable cylinders—easy to convert from 10-inch jolt cylinder to 12-inch or vice versa.

Easy to operate—perfect balance and fine quality anti-friction bearings minimize manual effort, prevent fatigue, enable the molder to produce the maximum number of molds.

Portable or stationary—a simple matter to remove the wheels and bolt down, or vice versa.

A minimum of working parts means "low maintenance"—always good news to a plant superintendent.

Rugged construction—the backframe, base and squeezer arm are of heavy steel.

Back of this modern machine are two stout reputations—Arcade's and Rockwell's. Into it is built Arcade's full understanding of foundry needs, based on 65 years of successful foundry operation and a half-century of manufacturing good molding machines.

And the name Rockwell is a dependable guarantee of stability, leadership in research and efficient service.

Write for Bulletin 120—gives you full information on this important new machine; and look for further vital developments at Arcade.

ARCADE

MANUFACTURING DIVISION
ROCKWELL MANUFACTURING COMPANY
FREEPORT, ILLINOIS

Industry Benefits from Successful Convention

SUCCESS of the annual convention and exhibition of the American Foundrymen's Association which was held in Philadelphia, May 3 to 7, demonstrated once again that foundrymen of the United States and Canada are continuing to improve the practices followed in the production of castings. An excellent technical program, a splendid exhibition of foundry equipment and supplies, and a highly satisfactory attendance of foundry executive personnel drawn from practically all sections of the country, are the principal features which combined to make the 1948 meeting one of the best in the history of the association.

The technical program included a wide variety of high quality papers and discussions which provided the usual broad coverage of problems connected with developments in various phases of foundry practice, and improvements in the properties of castings. Attendance at the sessions was good, and as has been the case for a number of years, the shop operating courses, which provide an open forum for the discussion of practical problems, drew exceptional crowds of interested participants. Perhaps the response to these courses indicates the possible value in extending them to cover other subjects.

The first year's activities of the association's Educational Division drew increased interest, and it is evident the industry still has a sizable job ahead if it is to attract young men to foundry work and train them effectively. In addition to the discussion of certain new ideas recently developed, such as enriching the cupola blast with oxygen, a movie illustrating the flow of metal into the mold appears to have disproved some accepted fundamentals on gating practice. This questioning of practices and the application of new tools to further investigations is the sign of a healthy and progressive industry.

The tremendous exhibition of foundry equipment and supplies, with its huge operating displays and a substantial number of new developments in many forms of mechanical equipment, illustrated well the magnitude and vitality of the foundry industry. Interest displayed during the entire week strengthens the knowledge that the program of improvement of plant facilities will continue to move forward. Foundrymen could not help but be inspired by the progress revealed in the 1948 show.

The officers, directors, national office staff and the Philadelphia Chapter of AFA should take great pride in the success of the 1948 convention and show. The industry owes a debt of gratitude to the authors of papers, to the many exhibitors, and to all others who made possible this important milestone in the march of foundry progress.

Frank G. Steinebach

Editor

THE FOUNDRY—WHEREVER METALS ARE CAST

AFA Convention

Stimulates Foundry

PHILADELPHIA was the focal point for a large segment of the foundry and allied industries May 3-7, when the 52nd annual meeting of the American Foundrymen's Association and the concurrent exhibition of foundry equipment, supplies and services attracted more than 9200 registrants and a total attendance of approximately 12,000.

A vast amount of information relative to latest developments in foundry practice was included in the more than 80 technical papers and discussions presented during the five days at some 50 individual sessions devoted to various phases of castings production. Heavy attendance marked the majority of technical meetings, this being particularly true of the shop course sessions, which provided opportunity for active discussion of practical subjects. Featuring the technical addresses were four papers prepared by members of foreign foundry groups. These included exchange papers from the Institute of British Foundrymen, Institute of Australian Foundrymen and the French Foundry Technical Association, and a paper by H. Morrogh of the British Cast Iron Research Association.

High light of the general meetings was the annual business meeting of the association and Charles Edgar Hoyt Annual Lecture, held Wednesday morn-

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PROGRAM

Progress

ing and presided over by President Max Kuniansky, vice president and general manager, Lynchburg Foundry Co., Lynchburg, Va.

At the election of officers held during this meeting William B. Wallis, president, Pittsburgh Lectromelt Furnace Corp., Pittsburgh, was named to succeed Mr. Kuniansky as AFA president in 1948-49, and Edwin W. Horlebein, president Gibson & Kirk Co., Baltimore, was chosen vice president. New directors elected for three years are: Thomas H. Benners Jr., T. H. Benners & Co., Birmingham; Norman J. Dunbeck, Eastern Clay Products Inc., Jackson, O.; Alfred M. Fulton, Northern Malleable Iron Co., St. Paul; Robert R. Gregg, Reliance Regulator Corp., Alhambra, Calif., and Victor E. Zang, Unitcast Corp., Toledo, O. As retiring president Mr. Kuniansky was elected a director for one year.

In a condensed version of his president's address Mr. Kuniansky pointed to progress in membership and technical activities of the association. An increase of about 800 members was reported since a year ago, the April 1 total of 10,174 including 134 student members and 450 in foreign countries. Approximately 92 per cent of the membership is affiliated with the AFA's 39 chapters. Recent growth in number of student chapters was referred to by

WILLIAM B. WALLIS
President-elect

EDWIN W. HORLEBEIN
Vice President-elect

Fig. 1—Charles E. Nelson, Dow Chemical Co., Midland, Mich., delivering the 1948 Charles Edgar Hoyt Annual Lecture at the Philadelphia convention. Subject of his lecture was "The Control of Grain Size in Magnesium Castings"

Figs. 2, 3—Some of the approximately 50 visiting foundrymen from more than 15 foreign countries who attended the congress. The AFA was host to foreign visitors at a reception held during the convention

Fig. 4—Scene at the annual banquet at Philadelphia's Bellevue-Stratford Hotel concluding the 52nd annual meeting. Principal speaker was Dr. Karl T. Compton, president, Massachusetts Institute of Technology

Below — Five new directors elected for three-year terms at the annual AFA business meeting. Max Kuniansky, retiring president, was elected a director for one year

NORMAN J. DUNBECK

THOMAS H. BENNERS JR.

Mr. Kuniansky as particularly significant. The speaker also mentioned the various AFA-sponsored research projects being conducted on sand, heat transfer, aluminum and magnesium, pearlitic malleable iron, bronze and steel, and indicated that publication of additional and improved technical books by the association is in prospect. In conclusion Mr. Kuniansky proposed a silent tribute to the late R. H. McCarroll, Ford Motor Co., who was elected a national director a year ago.

W. W. Maloney, national secretary-treasurer, presented the report of the nominating committee for new officers and directors and, in the absence of other nominations, cast a unanimous ballot for their election. He then announced the names of winners in the recent AFA apprentice contest, complete details of which are presented on page 124. First-place winners in the four classifications—gray iron, steel, nonferrous and patternmaking—were present at the convention as guests of the AFA and received their awards from Mr. Kuniansky. Respective titlists in these groups were Dean Morehead, Caterpillar Tractor Co., Peoria, Ill.; Adolph Scanzoni, Continental Foundry & Machine Co., East Chicago, Ind.; Thomas Craven, Howard Foundry Co., Chicago, and Dwight French, Caterpillar Tractor Co.

In addition to a message of greetings sent to the convention by Tom Makemson, secretary, Institute of British Foundrymen, best wishes from that organization were extended personally in brief remarks by E. Longden, P. R. Jackson & Co. Ltd., Manchester, England, who also delivered the exchange paper from the institute at another meeting during the convention.

Mr. Kuniansky stressed the importance of educational work by the AFA and the foundry industry, and introduced Philip Johnson, recently appointed to head the association's educational activities, and Fred G. Sefing, International Nickel Co., chairman of the Educational Division. Mr. Sefing briefly re-

ALFRED M. FULTON

VICTOR E. ZANG

ROBERT R. GREGG

ferred to important factors in educational work, particularly the necessity of a good training program for young men brought into the foundries.

At the conclusion of the business meeting H. Bornstein, Deere & Co., Moline, Ill., chairman of the Annual Lecture Committee, introduced Charles E. Nelson, Dow Chemical Co., Midland, Mich., who presented the annual Charles Edgar Hoyt Annual Lecture. Mr. Nelson's lecture, entitled "The Control of Grain Size in Magnesium Castings," consisted of an unusually comprehensive review of the subject, incorporating considerable detail on the various factors which affect grain size and the methods of controlling it. The latter included results of numerous studies on both superheating and inoculation.

Convention attendance by foundrymen from foreign countries did not measure up to that of two years ago, when the first postwar Foundry Show was held in Cleveland, although more than 15 nations were represented by the approximately 50 men who registered in the international "guest book" maintained during the week. England, France, Mexico and China, led the registrants. Canada, as usual, was well represented at the convention with an estimated attendance of well in excess of 150.

A large number attended the annual Canadian dinner held Wednesday evening at the Benjamin Franklin Hotel. The majority present represented the Ontario and Eastern Canada & Newfoundland Chapters, but two members reported from the British

Fig. 5—E. Longden, P. R. Jackson & Co. Ltd., Manchester, England, who presented the Institute of British Foundrymen Exchange Paper at the Philadelphia convention

Fig. 6—H. Bornstein, Deere & Co., AFA past president, introducing the Charles Edgar Hoyt lecturer

Fig. 7—President Kuniansky presenting prizes to first-place winners in the AFA apprentice contest. Winners left to right are: Dwight French and Dean Morehead, Caterpillar Tractor Co., Peoria, Ill.; Adolph Scanzoni, Continental Foundry & Machine Co., East Chicago, Ind., and Thomas Craven, Howard Foundry Co., Chicago

Fig. 8—Good attendance was recorded at the various technical sessions

Fig. 9—John M. Robb Jr. (right), Hickman, Williams & Co., Philadelphia, and an AFA national director, who served as chairman of the local chapter's general committee on convention arrangements. He is shown with L. S. Lewis, Tabor Mfg. Co., Philadelphia

Fig. 10—Scene at the annual business meeting, with W. W. Maloney, national secretary-treasurer, speaking

Columbia Chapter, and a like number from Manitoba. E. N. Delahunt, Warden King Ltd., Montreal, a national director, presided at the informal gathering. Guests at the speaker's table included current and incoming officers of the national association, Bob Kennedy, C. E. Hoyt, Joseph Sully, past director, and O. L. Voisard, vice chairman, Eastern Canada and Newfoundland Chapter, Montreal. At the invitation of the chair Mr. Voisard delivered a short but eloquent address in French. He eulogized the commendable relationship existing between the two great nations and trusted that it would continue in the future between Canada and Les Etats Unis!

Another informal dinner gathering brought together officers and directors of the various AFA chapters, with representatives present from practically all of the groups. President-elect W. B. Wallis presided, assisted by President Max Kuniansky and Secretary W. W. Maloney, all of whom spoke briefly.

The AFA Alumni Group, comprising past and

present national officers, directors, medalists and honorary life members, held its annual dinner Thursday evening, and was attended by the majority of the present 23 past presidents. Sheldon V. Wood, president, Minneapolis Electric Steel Castings Co., and immediate past president, presided over the gathering. Ivan H. Peterman, columnist, *Philadelphia Inquirer,* recently returned from Europe, gave an interesting talk, particularly on the Italian situation as he recently saw and analyzed it.

A near-capacity gathering marked the annual banquet in the Bellevue-Stratford ballroom Friday evening. President Max Kuniansky presided. Sheldon V. Wood, immediate past president and chairman of the board of awards, took the chair for the annual presentation of awards, one of the features of the evening. The William H. McFadden Gold Medal was presented to Egbert H. Ballard, Swampscott, Mass., by James L. Wick Jr., president and treasurer, Falcon Bronze Co., Youngstown, O., and past president of AFA. Richard G. McElwee, Vanadium Corp. of America, was presented the John A. Penton Gold Medal by Fred J. Walls, International Nickel Co., Detroit, and past president of AFA. Peter E. Rentschler, president, Hamilton Foundry & Machine Co., Hamilton, O., was tendered the Peter L. Simpson Gold Medal by Walter L. Seelbach, president, Superior Foundry Inc., Cleveland, and past national director. An honorary life membership in the association was presented to Max Kuniansky as retiring president by Mr. Wood.

Principal address at the banquet was given by Dr. Karl T. Compton, president, Massachusetts Institute of Technology, Cambridge, Mass. His talk, entitled "Team Play of Hand and Brain," afforded the speaker the opportunity to present thought-provoking comment on his conception of the basic factors in the advance of civilization and the part which tools have played in scientific developments.

The banquet also was the occasion for Mr. Kuniansky to announce that the 1949 AFA convention would be held in St. Louis the first week of May.

Ladies' entertainment program for the convention was ably handled by Mr. and Mrs. Howard J. Williams, who, with their committee, provided for the leisure hours of approximately 450 ladies registered during the week. Registration headquarters were at the Bellevue-Stratford Hotel where special use of the Clover Room had been provided for use in the evenings while the men attended meetings. A reception, tea and style show held Tuesday afternoon in the auditorium of the John Wanamaker Store was well attended. Despite intermittent rains large groups took advantage of the motor tours arranged for by the committee. On Wednesday the program included a tour of interesting historical places in central Philadelphia, Franklin Institute and Fels Planetarium, and the following day a trip to Valley Forge provided entertainment for the entire day.

A large number of convention visitors participated in the program of plant visitations arranged by the Philadelphia Chapter. Plants available for inspection represented a wide range of products and operating practices in both ferrous and nonferrous metals. Philadelphia Naval Shipyard designated May 5 as American Foundrymen's Association Day and had its various facilities open for inspection in a specially arranged program.

Plants and plant equipment provided the subject for an interesting technical session Tuesday evening, when Lester B. Knight, Lester B. Knight & Associates Inc., Chicago, discussed "Modernization of the Small Foundry" at a meeting sponsored by the Plant and Plant Equipment Committee. James Thomson, Continental Foundry & Machine Co., East Chicago, Ind., presided, with E. W. Beach, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., serving as co-chairman.

The speaker emphasized that no foundry can afford not to modernize and (*Please turn to page* 138)

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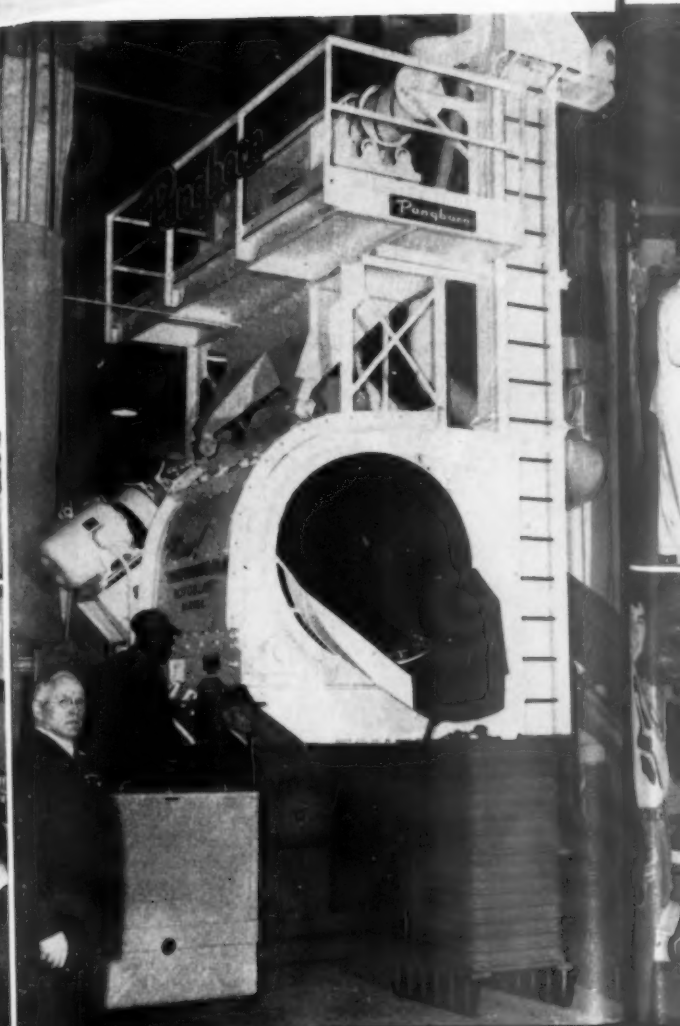
Foundry Show

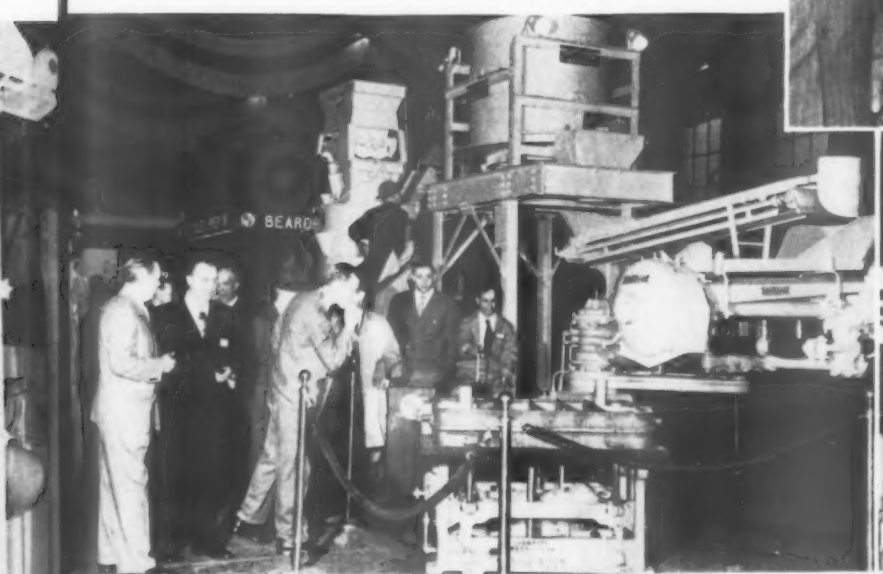
REFLECTS NEW OPERATING TRENDS



THE show is over and the crowds have gone home. Workmen have torn down the displays, and the many machines that basked in the limelight for one busy week now are on their way to widely scattered foundries where they soon will be placed in operation to help produce castings to meet the needs of our civilization.

But the memories of the 1948 exhibition of foundry equipment and supplies will live for a long time in the minds of those who were privileged to view the displays in Philadelphia's Convention and Exhibition Halls. It was a great show. Something about the 1948 exhibition made it rank alongside other great shows staged for the foundry industry under the management of the American Foundrymen's Association.

On Monday morning when the lights went on and the crowds began to pour into the Exhibition Hall, Ed Hoyt, the old master in the field of industrial exhibits, proudly told the writer that this show probably will go down in history as the best foundry exhibition ever held. Bill Maloney, secretary-treasurer of AFA and Al Hilborn, exhibit manager, likewise were most enthusiastic. And as the week moved rapidly along, comments from exhibitors and show visitors alike confirmed the excellence of the performance. It was the consensus of the thousands of foundrymen who tramped the miles of aisles to see and learn that the visit to this exhibition of foundry equipment and supplies had been very much worth while. (*Please turn to page* 168)

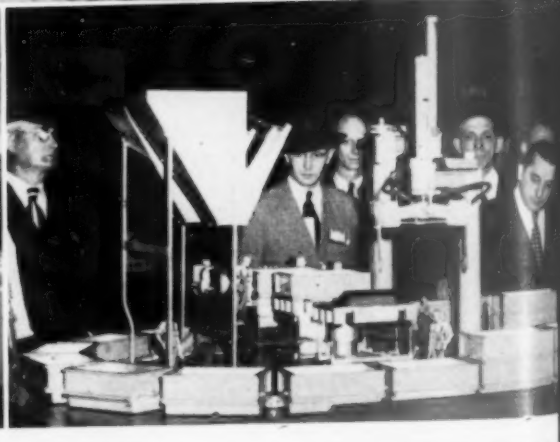


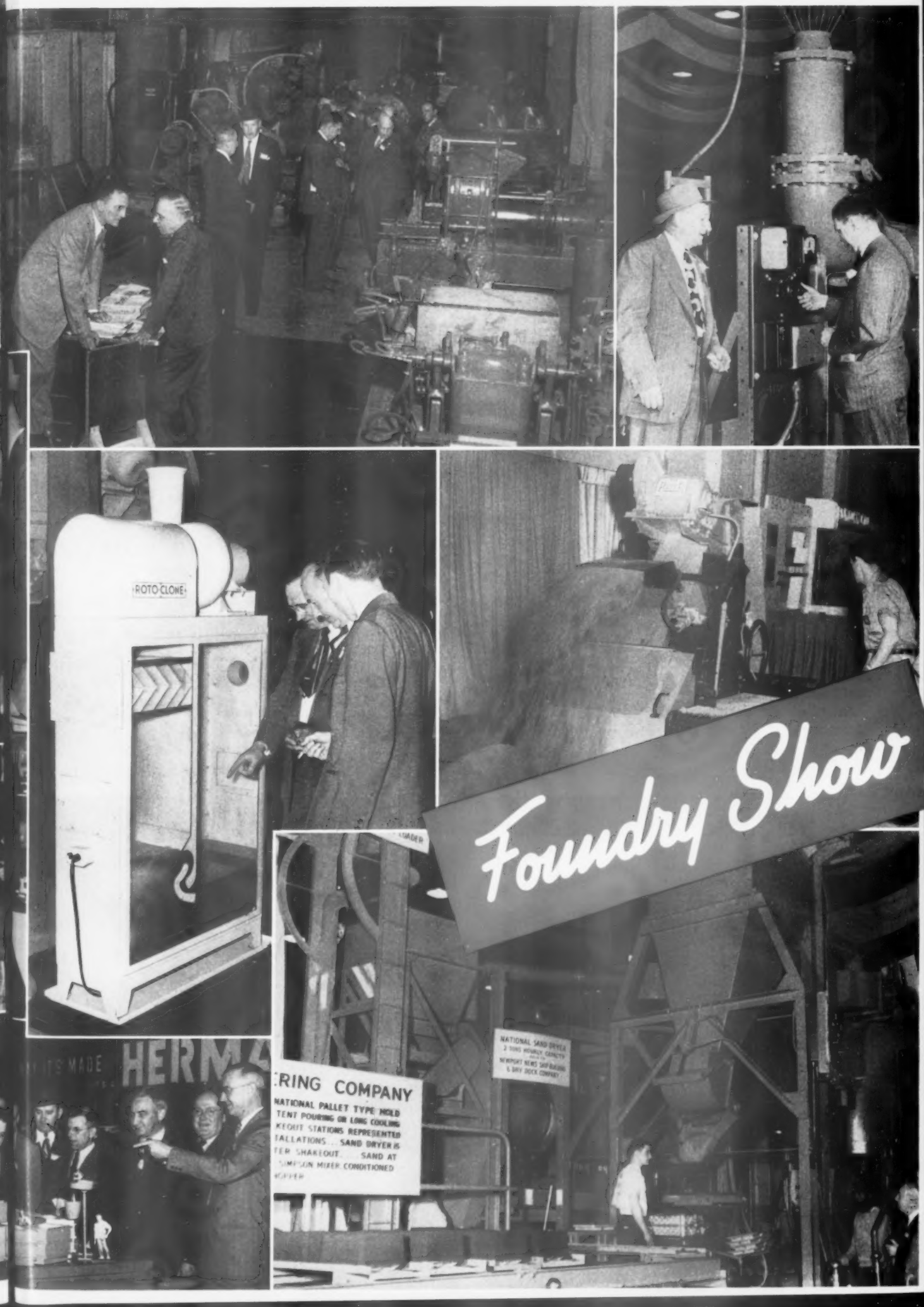
The Continuous
WHEELABRATOR TUMBLAST

THE MILLER-WELLMAN
CORE BOX MACHINE

FOUNDRY

DESTROYER TYPE
PROPELLER




ROTO CLONE
Foundry Show
RING COMPANY
NATIONAL PALLET TYPE MOLD
TENT POURING OR LONG COOLING
KEOUT STATIONS REPRESENTED
TALLATIONS ... SAND DRYER IS
TER SHAKEOUT ... SAND AT
SIMPSON MIXER CONDITIONED
NATIONAL SAND DRYER
2 TONS HOURLY CAPACITY
NEWPORT NEWS SHIPBUILDING
& DRY DOCK COMPANY

By JOHN A. SHARRITTS
Superintendent of Foundry
Westinghouse Electric Corp.
Cleveland

Westinghouse Is Operating an Automatic Molding

THE challenge to meet an ever-increasing demand for maximum yield of high-quality castings at reduced cost has been met by what is believed to be the first practical, completely automatic molding unit for mass production of castings. Through the joint effort of experienced foundry and equipment engineers an automatic unit now is operating using multiple molding methods to produce production castings at greatly reduced cost per unit casting. Floor area and man-hours per casting have been reduced to a minimum.

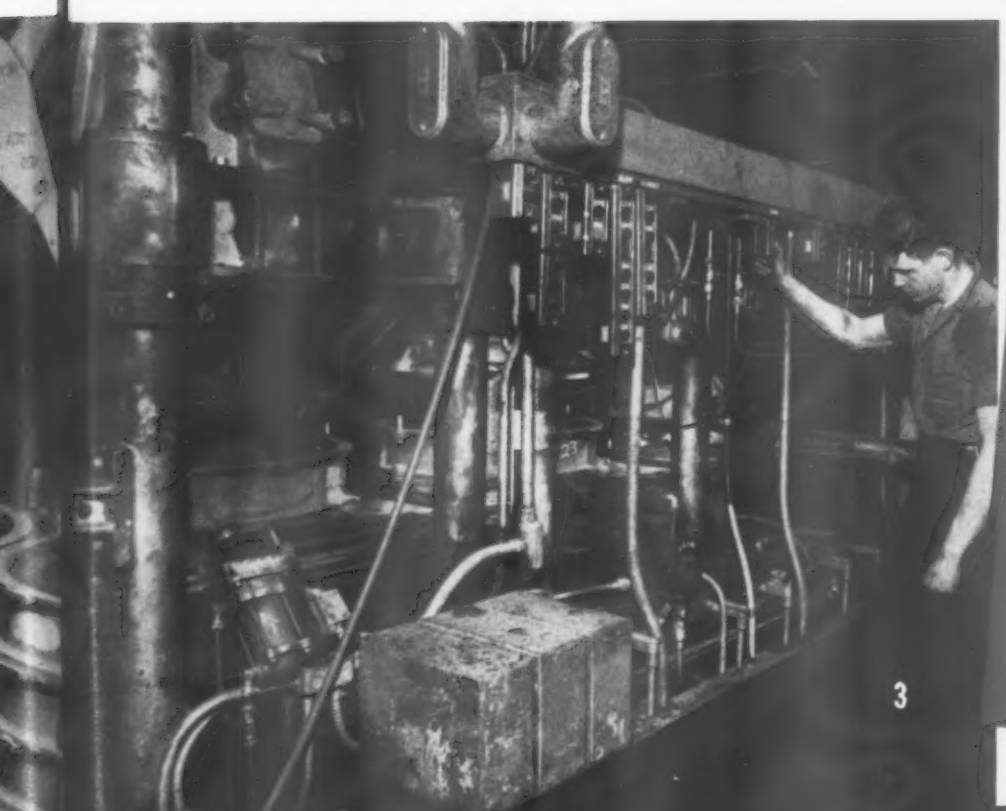
While much progress has been made in recent years in the general advancement of the principle of multiple-molding molding machine design, the improvement of core-blowing-machine operation, both with core sand and with molding sand, and the application of automatic and semi-automatic principles to many of the individual mechanical operations, the complete integration of all of this development into a single unit has not previously been accomplished. Joint creative effort provided by International Molding Machine Co., La Grange Park, Ill., and Westinghouse Electric Corp. has resulted in the development of a self contained molding unit operated by electrically-controlled air and hydraulic power, capable of performing all of the related functions and operations required to produce molds from introduction of the sand ingredients into the conditioning system through and including completion of the molds stacked and ready for pouring. National Engineering Co., Chicago, engineered the sand conditioning and sand and mold conveying systems, and several other manufacturers as shown on page 216, co-operated in the design and manufacture of related items.

The following description of the installation at the Westinghouse Electric Corp., Cleveland, should be of much interest to all who are engaged in the advancement of foundry methods.

Fig. 1—General view of the automatic molding unit
Fig. 2—A mold conveyor runs completely around the unit
Fig. 3—Cope and drag impressions are formed at the first two work positions. The proper amount of sand is blown in at the position to the left and the mold is squeezed at the right
Fig. 4—Flow diagram of mold operations. Molds are built up in machine at the center, passing from left to right. Reaching the outside conveyor, they travel clockwise by the pouring position to the shake-out when flasks are returned again to the molding machine. Pallets travel counter-clockwise in the smaller, inner loop

Unit

1



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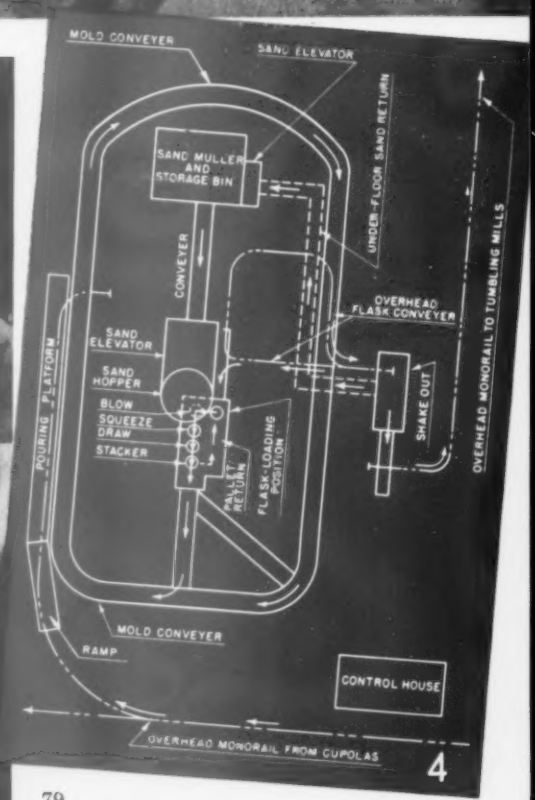

MOLD CONVEYER
SAND ELEVATOR
SAND MULLER AND STORAGE BIN
UNDER-FLOOR SAND RETURN
CONVEYER
OVERHEAD FLASK CONVEYER
SAND ELEVATOR
SAND HOPPER
BLOW
SQUEEZE
DRAW
STACKER
SHAKE OUT
OVERHEAD MONORAIL TO TUMBLING MILLS
POURING PLATFORM
PALLET RETURN
FLASK-LOADING POSITION
MOLD CONVEYER
RAMP
CONTROL HOUSE
OVERHEAD MONORAIL FROM CUPOLAS

4

Automatic Molding Unit

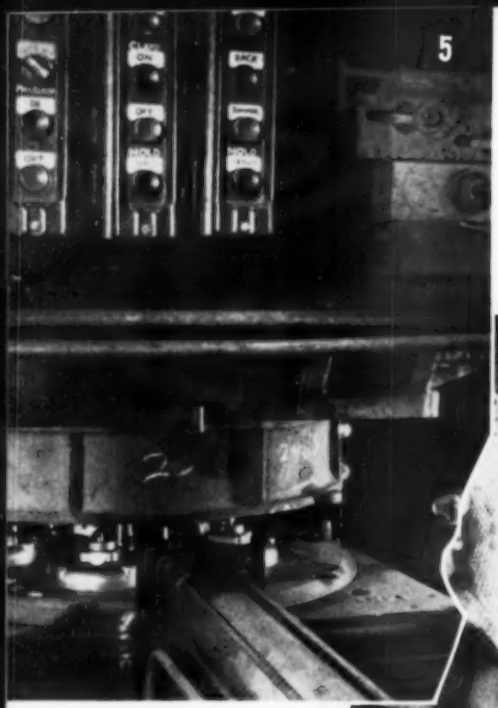


Fig. 5 — Flask and mold are lifted from the cope pattern in the draw work position

Fig. 6—Cores are set as shown at the stacking position

Fig. 7 — Stacks of molds here have progressed to the pouring position

Fig. 8 — The completed stack here is ready to be pushed automatically onto the conveyor system

Fig. 9—In this close-up view, the method of stacking can be seen in greater detail

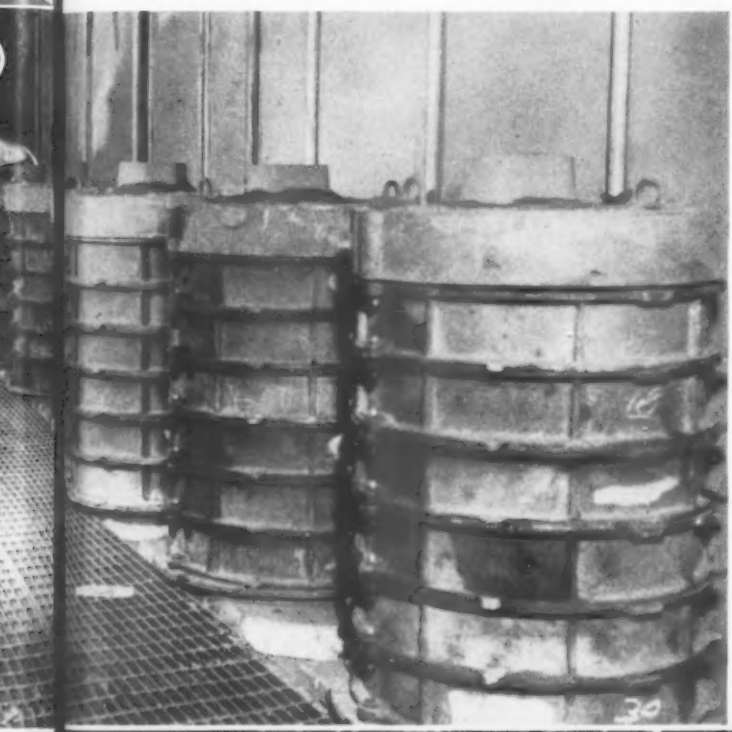
The Westinghouse installation as now rigged is directed toward mass production of gray iron castings used in the manufacture of end brackets for fractional horsepower motors. Several million of these castings are required yearly. The molding procedure as performed by this unit is a simplified application of the multiple molding method. Round, tight steel flasks are used with five patterns per flask and with the flasks stacked six high. There are 25 castings poured for each stack of molds produced. The complete unit manufactures the molds, arranges the molds in stacks, and delivers the stacked molds to a mold conveyor. The operations required to perform this work are accomplished automatically, at a predetermined controlled speed, and with mechanical precision and uniformity.

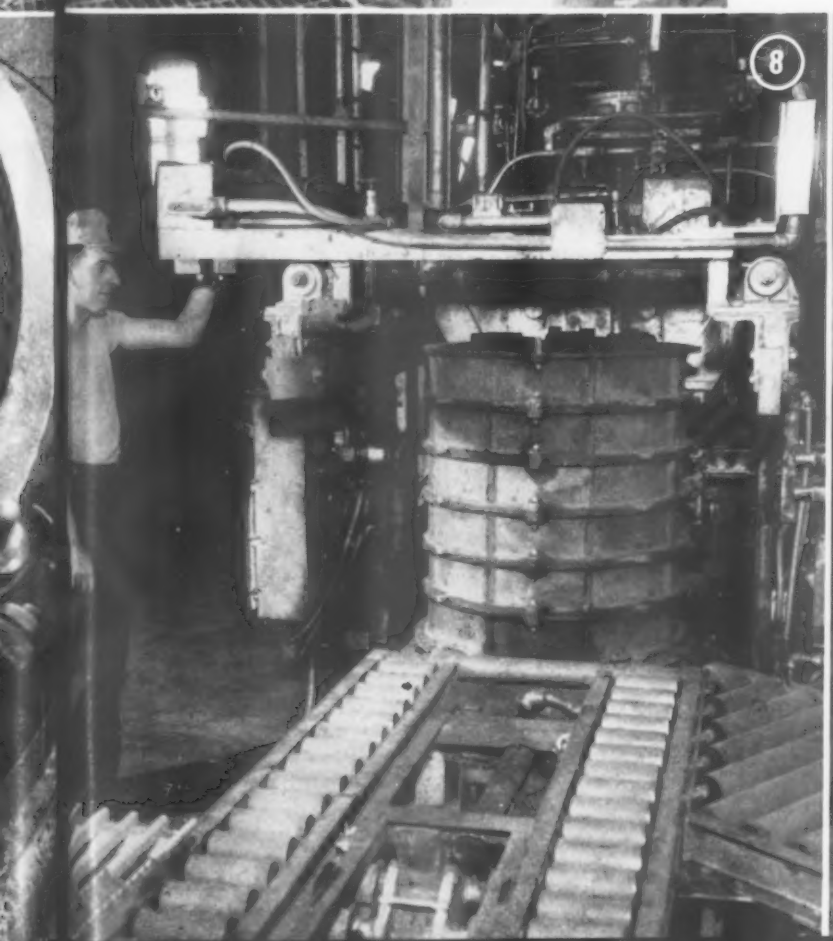
The complete unit occupies a floor space aproximately 48 ft wide and 100 ft long and consists of the molding machine as seen in Fig. 1 which is the heart of the overall operation, a complete sand-conditioning and sand-and-mold conveying system, cooling hoods, shakeout, pouring loop, dust collecting system, control room, and other minor items of equipment usually found in a modern mechanized foundry molding operation.

All items of equipment serving this unit are arranged in a synchronized operating sequence actuated by air and hydraulic power under complete electrical timing and control.

The molding machine may be considered the heart of this automatic molding unit, and it is in this machine that the major creative accomplishment has been made. The molding machine is a self contained unit aproximately 18 ft long, 7 ft wide, and about 15 ft high, and rests on a shallow foundation extending about 18 in. below the floor level. The machine is located on the inside of the mold conveyor at one end of the loop, as can be seen in the view taken from near the shaker unit shown in Fig. 2. In general, the design used follows that employed for heavy press construction.

There are four principal work positions in the molding machine. These positions may be identified by the work performed and the order of performance as, the blow, the squeeze, the draw, and the stacking positions.





Automatic Molding Unit

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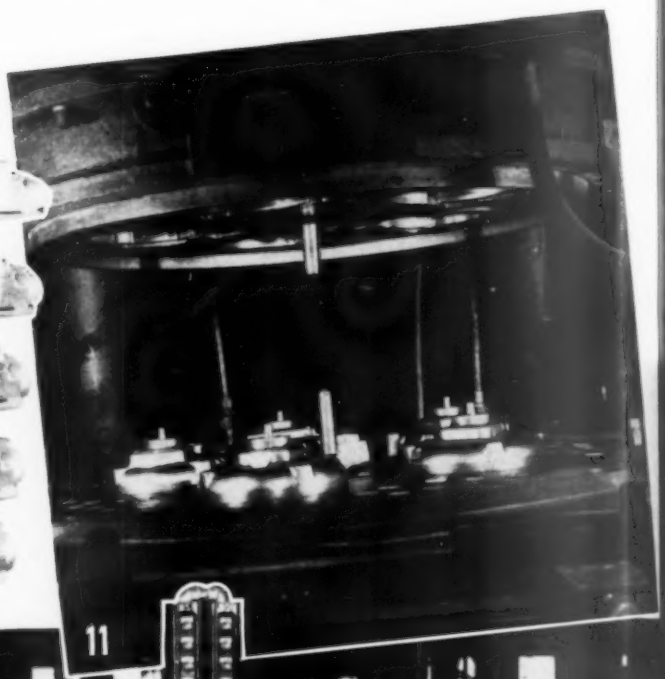

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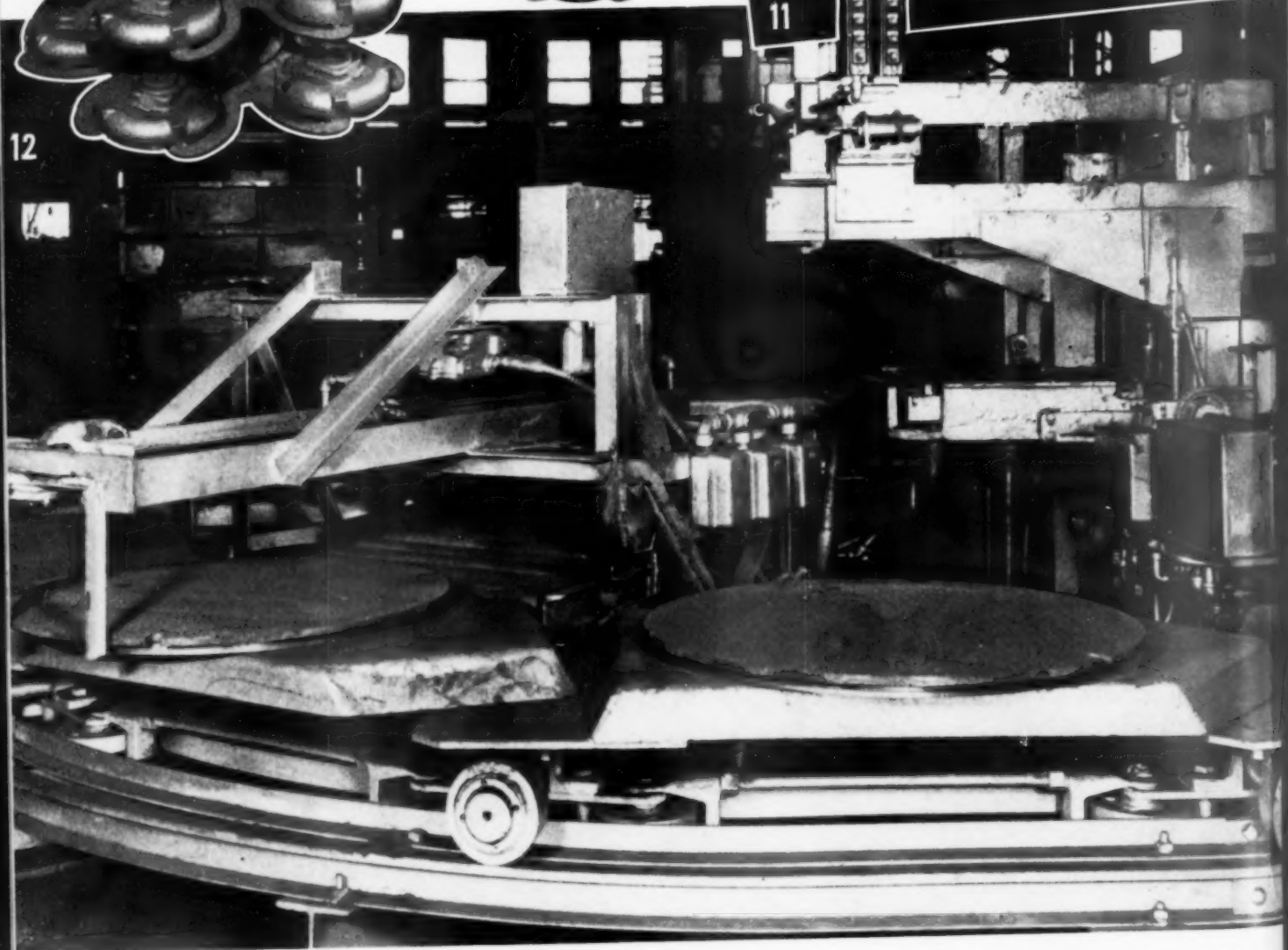

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As shown in Fig. 4, pallet plates on which cope patterns are mounted, are moved through the work positions of the machine on a rectangular course in a counter-clockwise direction. Travel of the pallet plates around this rectangular course is made up of a series of intermittent movements during which the pallet plates are engaged by a positive drive mechanism which controls and locates their movement. After the mold has been completed and the pattern drawn at the draw position, the pallet is carried across to the return side of the rectangular course and moved on around to receive the empty flask and start the next cycle. There are eight pallet-plate positions in the course of travel but only five pallet plates are used. This provides three open, or travel, positions that serve as a cushion in the continuous travel of the pallet plates through the machine. Whereas the movement of the plates through the work positions of the machine is under positive mechanical control and indexed from position to position, on the return side of the course at the rear of the machine it is possible for a plate to travel free through as many as four positions if necessary. This introduces a factor of flexibility necessary to insure keeping all work positions on the machine continuously loaded. The travel of the pallet plates carrying the cope patterns through the machine and around the rectangular course is accomplished automatically, and is timed and tied in with the continuous operation of the molding machine.

The first of the four principal work positions, as shown in Fig. 3, is a specially designed core blower of the hydraulic type which measures and places the sand in the flask and produces what may be described as a pre-form of the mold. Second, a hydraulic squeezer produces the accurate, finished mold impres-

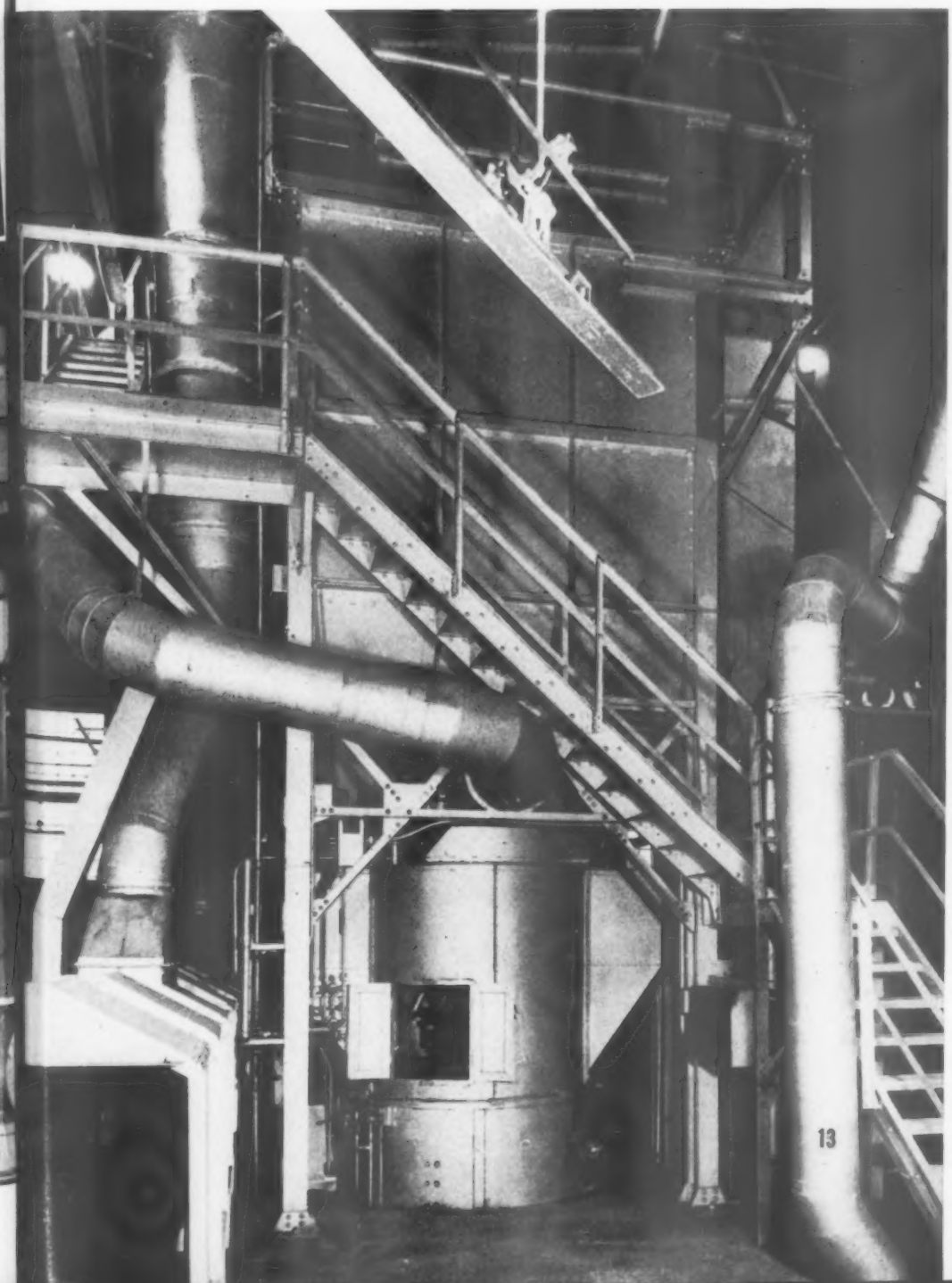


Fig. 10—Multiple molding produces casting gates like these

Fig. 11—View of cope and drag pattern arrangement

Fig. 12—In this hydraulically operated mold conveyor, the ram at left pushes bottom boards into place for new stacks

Fig. 13 — Sand muller and storage bin are shown in the foreground

sion from the pre-formed mold as received from the blower. In the third position, shown in Fig. 5, the draw machine lifts the flask and completed mold from the pattern pallet plate and conveys the flask and mold to the stacking position. Fourth, the stacking machine receives the completed mold from the draw position, one flask at a time as shown in Fig. 9, and arranges the molds in stacks of six, closing each mold cavity as the stack is accumulated like those in Fig. 8. These related functions are electrically timed and controlled to produce the completed stack of molds in continuous sequence.

The molding operation is of the multiple type. Each flask and mold contains two pattern impressions, the under side of the mold being the cope and the top side the drag. The complete mold cavity is obtained by stacking the individual molds. The pattern impressions on the extreme top and extreme bottom of the stack are, of course, ineffective and the stack of six flasks contains five complete mold cavities in which metal is poured, as can be seen in Fig. 7.

Cope and drag patterns are required to produce molds of this nature. The pattern equipment consists of five sets of cope patterns mounted on the five pallet plates previously mentioned. There are two drag patterns, one mounted on the head of the blower and one on the head of the squeezer. The pattern on the blower head is distorted to the extent that when the mold is blown, the preform will be of a proper contour and with just the correct amount of sand in the flask so that when it is squeezed in contact with the true drag pattern in the squeezer, the result will be a mold of proper density having an accurate impression. The cope patterns which are mounted on the pallet plates are true patterns and remain in the mold throughout the draw operation. A view of the pattern arrangement is shown in Fig. 11.

While the operation of this automatic molding machine is a combination of related separate functions performed simultaneously and intermittently in a continuous flow, it will be further enlightening to follow a single flask through one complete operating cycle of the machine. Reference to Fig. 4 will assist in following these operations.

An empty flask is placed over a cope pattern on one of the pallet plates when it is at rest in the position adjacent to the shakeout. The flask and pallet plate are then advanced to the position on the work side of the machine immediately ahead of the blow position, where they are engaged by the indexing mechanism and moved into (*Please turn to page* 216)

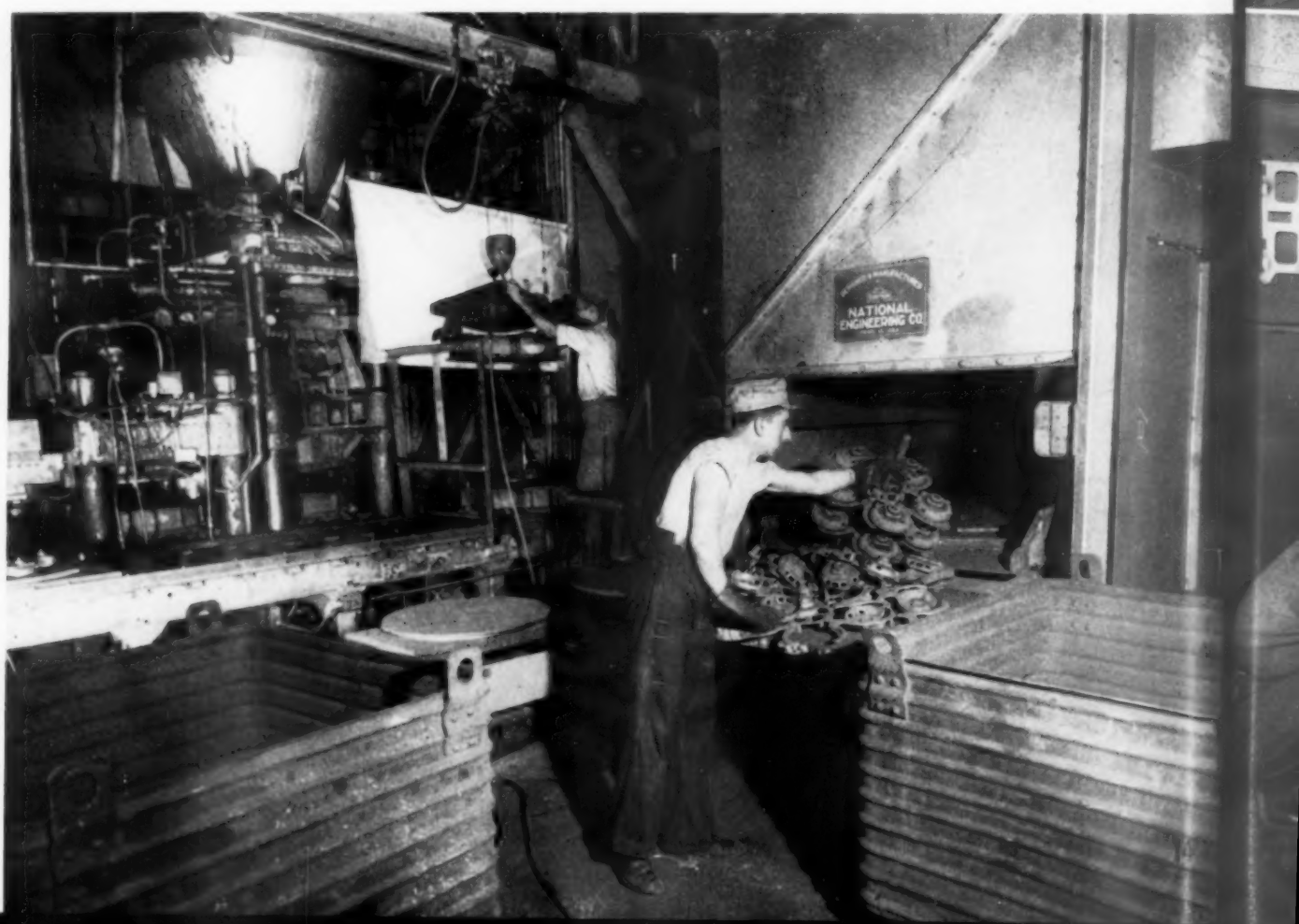
Fig. 14—Molds are shaken out in this machine, the sand returning on an under-floor conveyor for reprocessing

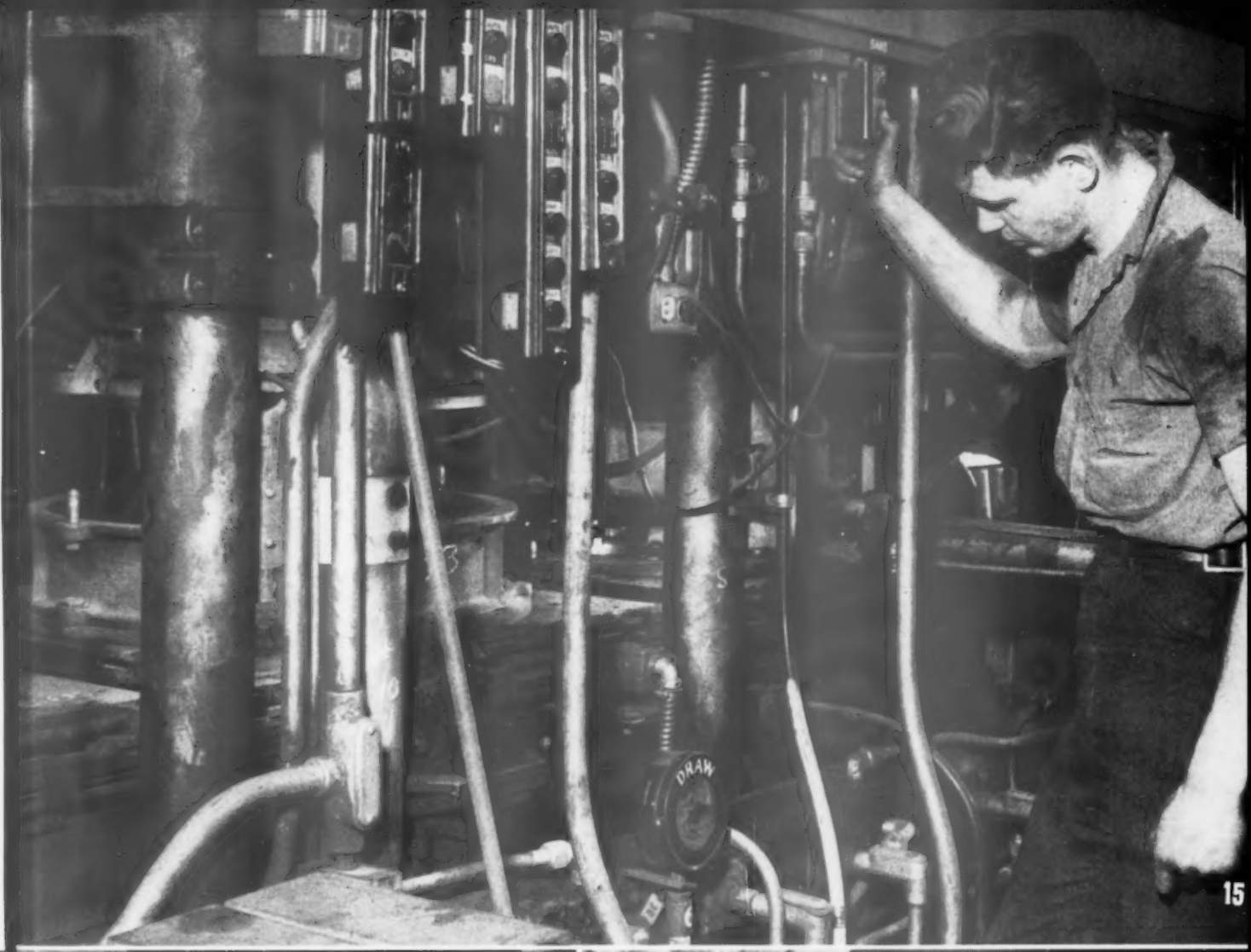
Fig. 15—Push-button stations on the molding machine allow control of any operation or combination of operations manually

Fig. 16—Electrical controls can be seen in this view of one of the control panels

Fig. 17—Bond hoppers shown in the center beyond the large pipe. Discharge end of the wet-dust collector is to the right

Automatic Molding Unit





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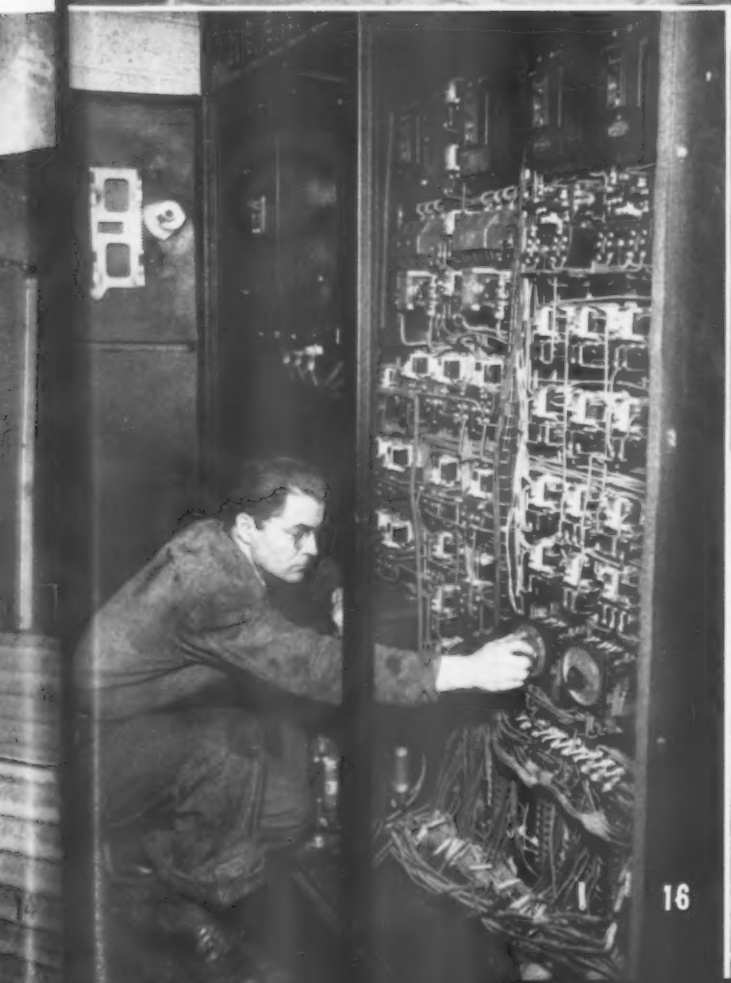

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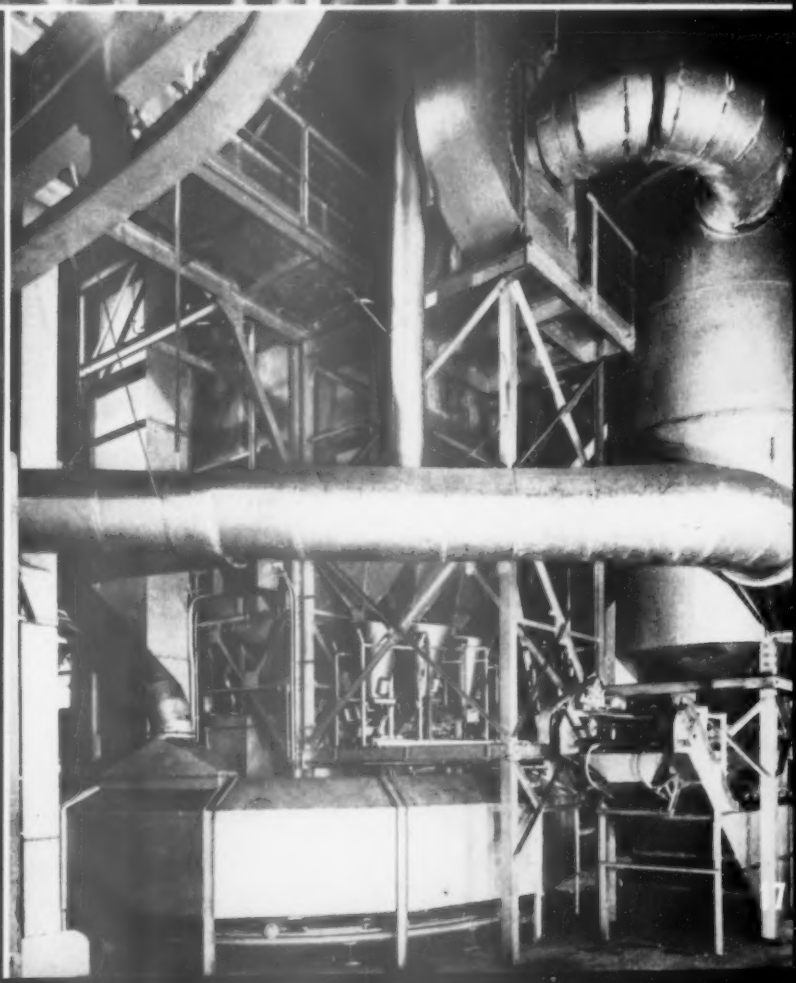

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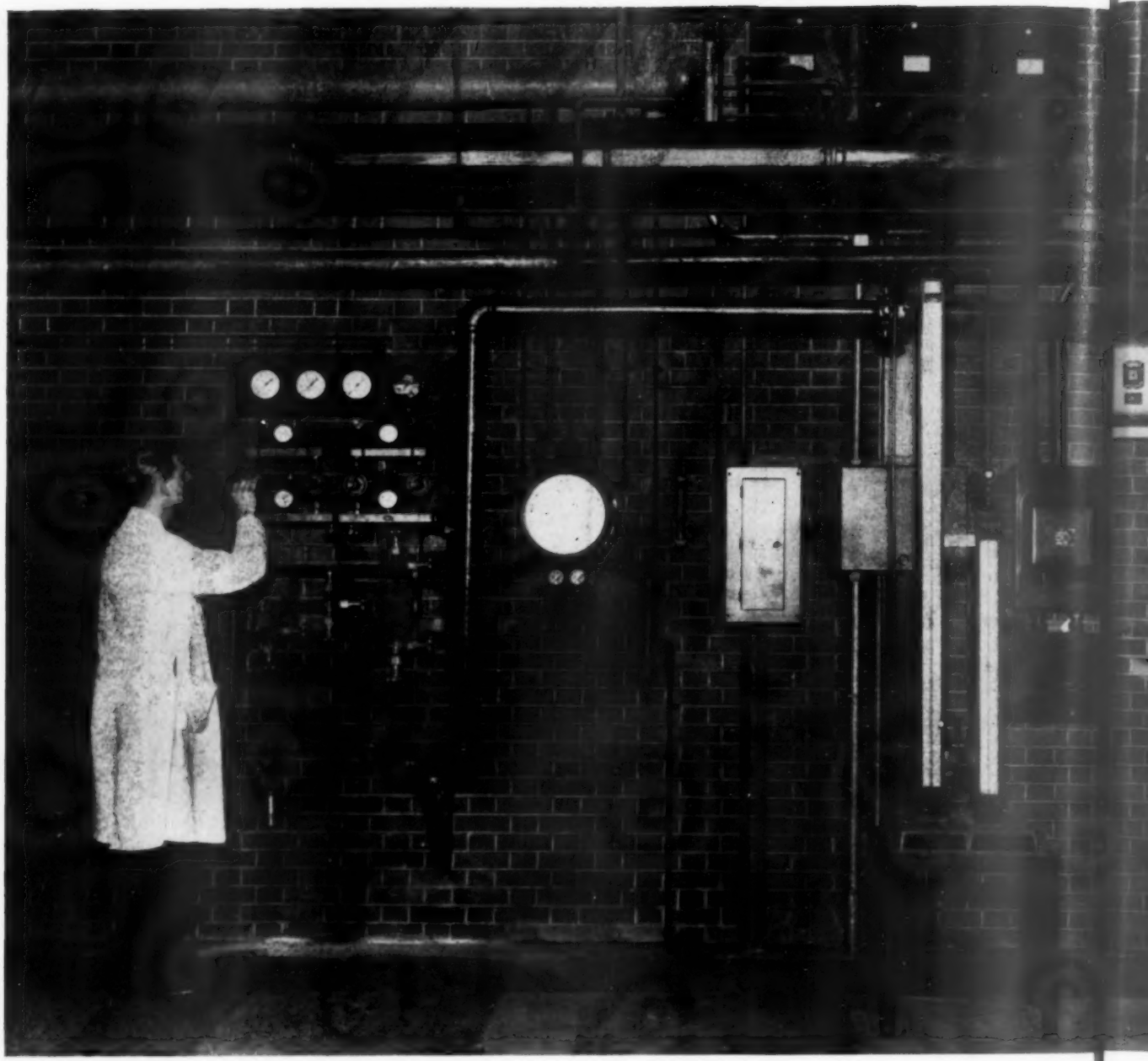

TABLE I—Comparative Data for Normal and Oxygen Enriched Blast Heats

HEAT NO.	MELTING TIME (MIN.)	MELTING RATE (LB/HR)	COKE RATIO	TOTAL BLAST VOLUME (C.F.M.)	OXYGEN ADDITION (% OF BLAST)	LEVEL OFF AVERAGE TEMP. (°F)	METAL CHARGED (LBS.)	METAL MELTED (LBS.)	METAL RECOVERED (LBS.)	MELTING LOSS (%)	INCREASED MELTING RATE (%)	REMARKS
2	115	2922	8-1	850	0	2675	5800	5600	5250	6.3	0	
3	113	3186	8-1	860	4.5	2700	6000	6000	5713	4.8	9.0	
4	100	3600	8-1	850	8.6	2775	6000	6000	5775	3.8	19.4	
6	82	4098	8-1	892	13.8		6000	5600	5596	0.07	40.2	BOOSTER CHARGE OF COKE ADDED DURING HEAT—NO LEVEL OFF
13	103	3096	8-1	700	9.9	2860	6000	5317	5191	2.3	5.9	
7	95	3789	12-1	817	8.2	2650	6000	6000	5825	2.9		
14	120	3200	12-1	550	8.1	2800	6400	6400	6362	0.6		
8	119	3000	7-1	850	8.7	2810	6000	5921	5835	1.5		
12	179	1836	5-1	850	0	2600	6000	5486	5389	1.6		
11	147	1956	5-1	850 750	0 8.0		4800	4800				OXYGEN USED TO SAVE HEAT
15	104	3228	8-1	700 850 670	9.4 0 7.1	2790	5600	5600	5473	2.2	10.7	

By A. W. GREGG
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Oxygen and Cupola Operation

Although more experimental work remains to be done, studies of oxygen additions to the cupola blast indicate the practice can result in substantially faster melting rate, higher metal temperatures and slag-free tuyeres. It also may provide a partial solution to the problem of poor quality coke

Fig. 1 — Control instruments used in studies of oxygen-enriched blast

FOR several years the application of oxygen to open-hearth and electric furnace practice has been the subject of considerable experimental work, and the procedure has been fairly well established and evaluated. Meanwhile information concerning the application of oxygen to cupola operation has been meager and, until recently, very little research work had been undertaken to determine its value in this important field.

Because of widespread interest in the subject, a series of heats, using various percentages of oxygen-enrichment in the blast, were made recently at Armour Research Foundation, Chicago. Results of this study were reported last month at the convention of the American Foundrymen's Association in Philadelphia.

The equipment used consisted of (1) a No. 1 cupola lined to 19 in. inside diameter, equipped with a skip hoist charger; (2) a blower of 2000 cfm capacity controlled by air weight equipment; (3) an oxygen generator, capacity 1000 cu ft per hour of oxygen having 99.5 to 99.6 per cent purity and free of moisture. This generator was connected to a storage bank having a capacity equivalent to 32,000 cu ft free oxygen. By-product coke of rather indifferent quality and sized to approximately 2 to 4 in. was used for all heats. Temperature measurements were made inside the cupola well with a radiamatic pyrometer sighted through a ceramic tube. Optical pyrometer readings were made on every tap at the cupola spout.

Several heats were made without oxygen and the data were tabulated for comparison with that obtained from the heats made with oxygen-enriched blast. Heat No. 2, Table I, which was used for comparison, is considered normal for a cupola of this size operated with normal blast and metal-to-coke ratio of 8 to 1.

Because the work at Armour Research Foundation was conducted with a very small cupola, further and similar experiments should be carried out with cupolas of the sizes used in commercial foundries. Possibly the results reported by Armour on a small cupola may not be comparable to those obtained on larger sizes. Also, for more conclusive results, it will be important to secure data from more heats than were made at the Research Foundation.

Cupola operators are principally interested in the effect of oxygen-enriched blast as it affects temperature, melting rate and various operating conditions such as the effect on lining life, melting loss, etc. Probably the most important question concerns the

cost of oxygen-enriched blast. Can the cupola operator afford to use oxygen?

The writer witnessed most of the heats made at Armour and has no hesitation in saying that the addition of small percentages of oxygen to cupola blast has an effect little short of magic. Any temperature within reason can be obtained; tuyeres remain bright and free of slag throughout the heat; melting rate can be increased to about 30 per cent above normal. Lining life will be affected somewhat adversely but only as should be expected from the increases in temperature.

Strangely enough, the oxidation loss of metalloids (carbon, silicon and manganese) seemed to be less with oxygen-enriched blast than when using normal atmospheric air. This is true also for the overall oxidation losses expressed as melting loss.

Oxygen additions can be used to regulate temperature and to get out of trouble when the iron is cold due to bridging and clogged tuyeres.

Heat No. 15—Fig. 2 is interesting in this connection. An addition of 9.4 per cent oxygen was added to the blast until the first tap was made. The temperature of the metal at that time was about 2950°F. The oxygen supply was shut off and the second tap, which was made about 10 minutes later, showed temperature of 2860°F. A third tap 8 minutes later showed 2720°F. Again 9.4 per cent oxygen was added to the blast for 5 minutes and the tap made at this time showed a temperature of 2810°F. A see-saw effect on temperature was produced in this way until the latter part of this heat at which time 7.1 per cent oxygen was added to the blast and temperature leveled off at approximately 2800°F.

There is a very definite limit beyond which any increase in the percentage of oxygen is of no value, and is even detrimental. Fig. 4 shows a graphic record of two heats, one of which (Heat No. 4) was made with an addition of 8.6 per cent oxygen, and the other (Heat No. 6) made with an addition of 13.8 per cent. The temperature of the metal made in Heat No. 4 showed 2950°F for the first tap and leveled off at about 2800°F after the second tap.

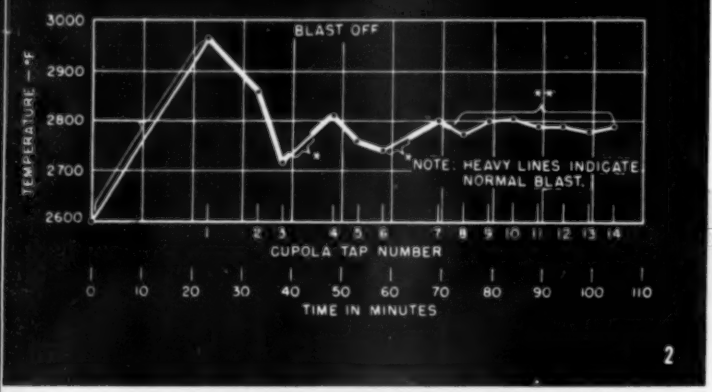
Heat No. 6, using an excessive addition of oxygen, had a temperature of 3000°F for the first tap, after which the second, third and fourth taps showed a progressive drop in temperature. Extra coke was charged at that time and for the succeeding taps, temperature increased rapidly, tap No. 8 showing a temperature of 2900°F. The excessive percentage of oxygen in the blast burned away the bed very rapidly and additional coke was required to keep it at proper level.

Heat No. 11, Table I, was started with normal blast using air only. A rich metal-to-coke ratio was used (5 to 1). Coke used in this heat was of poor structure and high in ash. After the fifth tap the cu-

HEAT NO.	MELTING TIME (MIN.)	MELTING RATE (LB/HR.)	COKE RATIO	TOTAL BLAST VOLUME (C.F.M.)	OXYGEN ADDITION (% OF BLAST)	MELTING LOSS (%)	INCREASED MELTING RATE (%)
15	104	3228	8-1	700 850 670	9.4 * 0.0 7.1 **	2.2	107

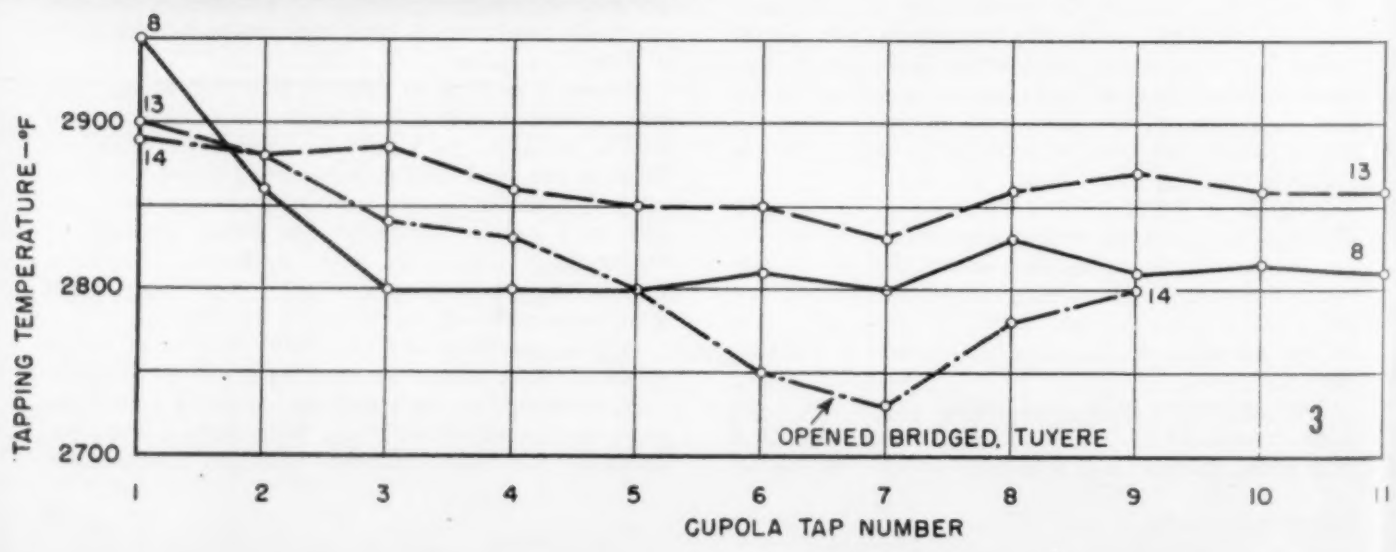
BLAST MANIPULATION

	APPROX. TOTAL VOL.	% OXYGEN	TIME ON	TIME OFF	MINUTES
BLAST ON	700 C.F.M.	30.4	2:00	2:23	23
	850 C.F.M.	21.0	2:23	2:39	16
	700 C.F.M.	30.4	2:39	2:44	05
	850 C.F.M.	21.0	2:44	2:57	13
	700 C.F.M.	30.4	2:57	3:03	06
	850 C.F.M.	21.0	3:03	3:11	08
	660 C.F.M.	28.1	3:11	3:44	33
				3:44	104


BLAST OFF
NOTE: HEAVY LINES INDICATE NORMAL BLAST.
TEMPERATURE — °F
3000
2900
2800
2700
2600
1 2 3 4 5 6 7 8 9 10 11 12 13 14
CUPOLA TAP NUMBER
0 10 20 30 40 50 60 70 80 90 100 110
TIME IN MINUTES

2

HEAT NO.	MELTING TIME (MIN.)	MELTING RATE (LB/HR)	COKE RATIO	TOTAL BLAST VOLUME (C.F.M.)	OXYGEN ADDITION (% OF BLAST)	MELTING LOSS (%)
8	119	3000	7-1	850	8.7	1.5
13	103	3096	8-1	700	9.9	2.3
14	120	3200	12-1	550	8.1	0.6



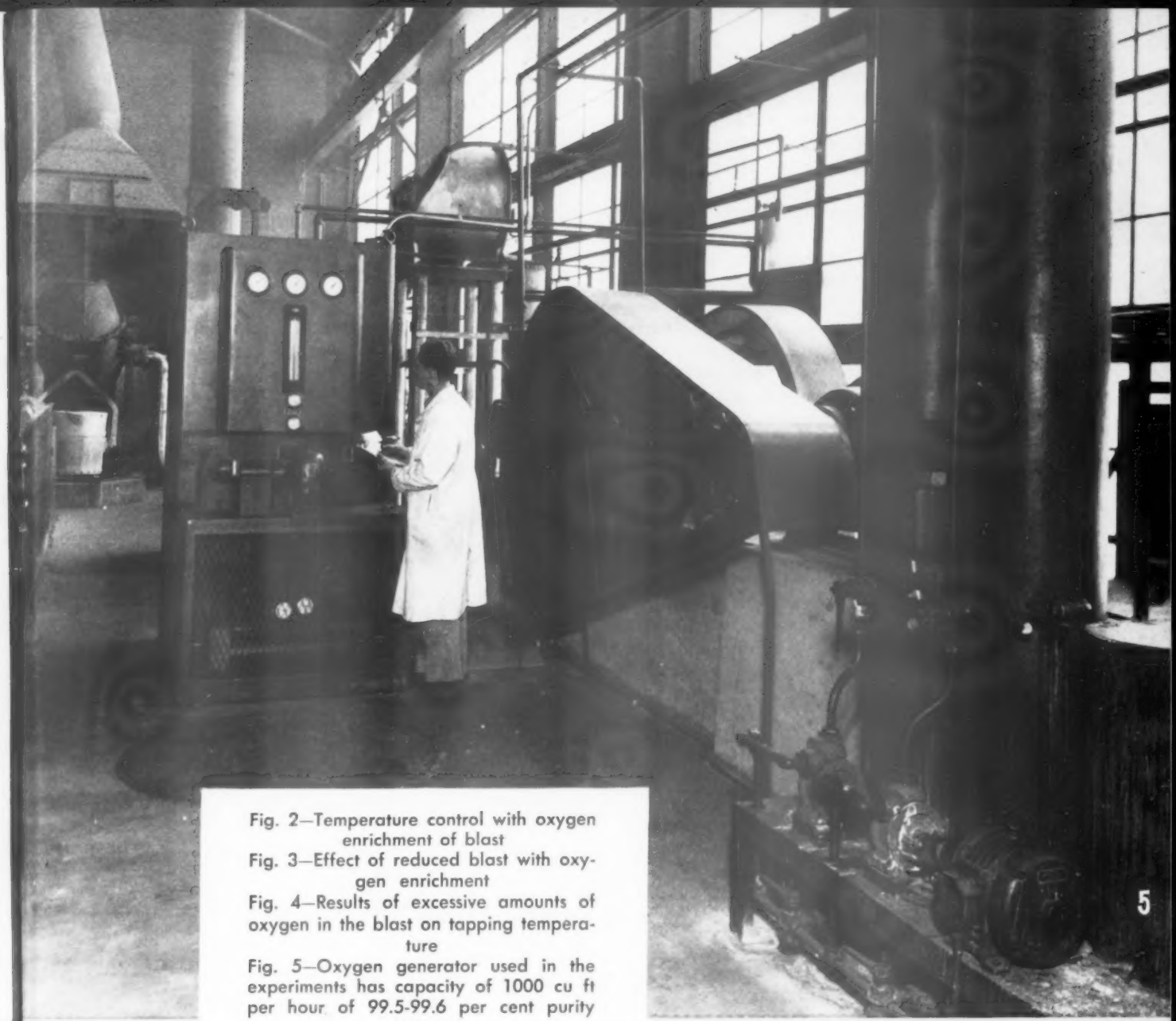
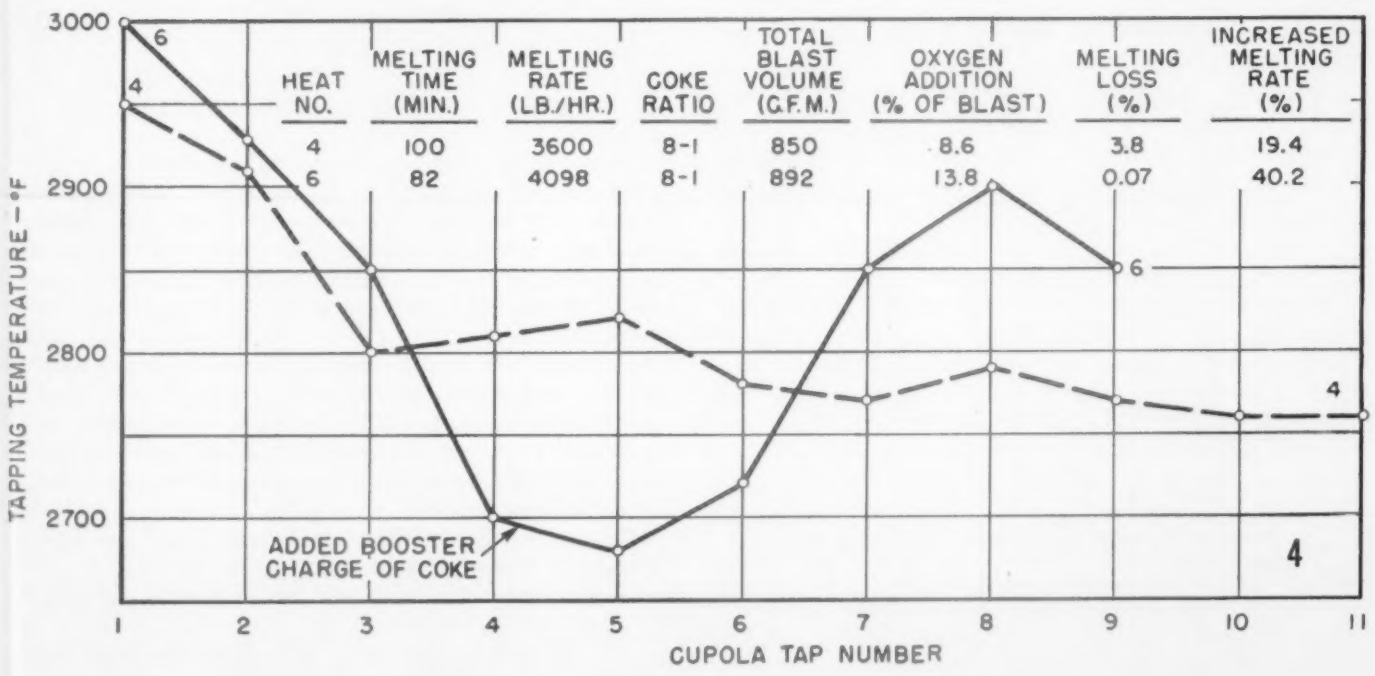


Fig. 2—Temperature control with oxygen enrichment of blast

Fig. 3—Effect of reduced blast with oxygen enrichment

Fig. 4—Results of excessive amounts of oxygen in the blast on tapping temperature

Fig. 5—Oxygen generator used in the experiments has capacity of 1000 cu ft per hour of 99.5-99.6 per cent purity oxygen



HEAT NO.	MELTING TIME (MIN.)	MELTING RATE (LB./HR.)	COKE RATIO	TOTAL BLAST VOLUME (C.F.M.)	OXYGEN ADDITION (% OF BLAST)	MELTING LOSS (%)	INCREASED MELTING RATE (%)
4	100	3600	8-1	850	8.6	3.8	19.4
6	82	4098	8-1	892	13.8	0.07	40.2

pola was so badly bridged that melting practically ceased. Oxygen was added to the blast and the balance of the heat was melted without difficulty. Because a supply of oxygen was available, it was not necessary to drop bottom with the charge only half melted.

Fig. 3 shows a comparison of the records for three heats made with various coke ratios and various total blast volumes. Heat No. 14, made with reduced blast volume and a 12 to 1 coke ratio, will show lowest operating cost. The oxygen addition was 8.1 per cent of the 550 cfm total blast volume. Temperature was satisfactory except for two taps (Nos. 6 and 7) due to a temporarily bridged tuyere.

To determine the effect of oxygen additions to the blast on lining life, the patching material used after each heat to repair the burned-out zone was carefully weighed. Table II shows the weight of material used for 13 repairs, together with the percentage of oxygen added to the blast. The increase in diameter was about the same as for heats made with normal blast, but the zone of highest temperature was longer, as indicated by a longer scar in the lining. This accounts for the increased weight of material used on some of the heats made with oxygen addition. Heat No. 13, made with reduced blast volume and oxygen-enriched blast, showed unusually small damage to the lining.

TABLE II—Lining Material Required After Various Heats

HEAT NO.	LINING DIAMETER AFTER HEAT (INCHES)	PATCH MATERIAL REQUIRED (POUNDS)	COKE RATIO	OXYGEN ADDITION (% OF BLAST)
2	25	210	8-1	0
3	25	245	8-1	4.5
4	25 ½	275	8-1	8.6
6		290	8-1	13.8
7	24	275	12-1	8.2
8	22	225	7-1	8.7
* 11		350	5-1	0
* 12	27	490	5-1	0
13	22	90	8-1	9.9
14	22	225	12-1	8.1
15	23	215	8-1	VARIABLE

* SODA ASH + LIMESTONE FLUX.

TABLE III—Cost of Oxygen Additions per Ton of Melt

CU. FT. OF OXYGEN PER MO. (20 DAYS)	TONS OF OXYGEN PER MO. (20 DAYS)	UNIT COST OF OXYGEN, DOLLARS/TON	UNIT COST OF OXYGEN CENTS/100 CU. FT.	DOLLARS COST/TON OF MELT PERCENT ADDITION 4	6	8	10
SMALL QUANTITY PURCHASE		180.00	75.0	9.40	13.30	17.20	20.60
" "	"	120.00	50.0	6.25	8.90	11.50	13.70
600,000	25.0	72.00	30.0	3.75	5.35	6.90	8.25
1,200,000	50.0	62.40	26.0	3.25	4.63	5.97	7.16
1,800,000	75.0	55.20	23.0	2.88	4.10	5.30	6.35
3,840,000	160	45.60	19.5	2.44	3.47	4.49	5.35
4,800,000	200	44.40	18.5	2.32	3.29	4.26	5.10
5,760,000	240	43.20	18.0	2.25	3.20	4.14	4.96
6,720,000	280	42.00	17.5	2.19	3.12	4.02	4.82
7,680,000	320	40.80	17.0	2.12	3.02	3.92	4.69
8,640,000	360	39.60	16.5	2.06	2.94	3.80	4.54
9,600,000	400	38.40	16.0	2.00	2.84	3.68	4.41
10,560,000	440	37.20	15.5	1.94	2.76	3.56	4.27
11,520,000	480	37.20	15.5	1.94	2.76	3.56	4.27
15,360,000	640	36.00	15.0	1.87	2.66	3.45	4.14
19,200,000	800	34.80	14.5	1.81	2.58	3.34	4.00
23,040,000	960	33.60	14.0	1.75	2.50	3.22	3.86
VERY LARGE QUANTITY PURCHASE		15.00	06.2	0.78	1.11	1.44	1.72
HUGE QUANTITY PURCHASE		5.00	02.1	0.25	0.36	0.46	0.55

The patching material was prepared from a formula developed at Armour for use in a side-blow converter. It was very satisfactory. The mixture, which was prepared in a muller, includes: 50 per cent ⅜-in. silica quartz ganister, 30 per cent ⅛-in. silica quartz ganister, 14 per cent No. 60 silica sand, 6 per cent western bentonite, 5 per cent water.

The cost of oxygen is subject to wide variation depending upon monthly consumption. The unit cost of oxygen at various monthly consumption rates is shown in Table III. The table also shows a calculated cost per ton of metal melted for various percentage additions for various monthly consumption rates. According to this calculation, the unit cost of oxygen per 100 cu ft varies from 75 cents for small quantity purchases to 6.2 cents for very large quantity consumption and as low as 2.1 cents for huge monthly consumption.

Must Weigh Oxygen Cost Against Savings

A foundry melting 500 tons of metal per day (or say 10,000 tons per month), using a 3 per cent oxygen addition to the blast throughout the entire melting period, would consume about 375 tons of oxygen per month. At this rate of consumption, oxygen could be generated for something between $39.60 and $38.40 per ton. A foundry with twice the above capacity, using the same percentage oxygen-enrichment, would consume about 750 tons of oxygen per month, which could be generated at a cost of about $35 per ton. The cost of oxygen per ton of melt in this case would be $1.31. These figures are based on estimates supplied by a manufacturer specializing in the manufacture of oxygen generators.

The increased cost of melting due to oxygen-enrichment must be balanced against the value of increased output, against possible savings in coke, and, most important of all, against savings due to hotter metal and less danger of misrun castings.

The smaller foundries will probably find the use of oxygen a help in time of trouble. When the cupola bridges, the metal is cold and scrap is high due to misruns, the cost to get out of trouble is not so important. In this case "it is any port in a storm." One foundryman, who is melting about 60 tons per day, told me recently that misrun castings cost him $5000 the preceding month.

Tables, charts and photographs used with this article are reproduced from the report of the Armour Research Foundation. This report should be considered as somewhat preliminary, and more or less a progress report. The data presented should be useful and can be used as a basis for further experimental work.

Additions of oxygen ranging from 3 to 8 per cent, corresponding to percentages of oxygen in the blast of 23.4 per cent and 27.3 per cent, respectively, as it enters the wind box, should produce excellent results in increased melting rates and increased metal temperatures.

The subnormal quality of the coke used in most foundries today presents a problem for which the use of oxygen may provide at least a partial solution.

Screwball Ideas

SOMETIMES

Work in the Foundry

By J. W. HORNER JR.
Slack-Horner Brass Mfg. Co.
Denver

SOMETIMES foundry technical papers are written in such a way that the ordinary foundryman cannot understand them. Authors of these papers might just as well be using a foreign language. After trying to read a few lines the reader gives up. The terms, the description and the way in which the paper is written fail to hold his attention. The entire effort is a dead loss from both the author's and reader's standpoint. This feature constantly has been kept in mind by the present writer who has had some metallurgical training, theoretical and practical, but most of whose training has been on-the-job experience with all the hard work, headaches and heart aches inherent to the foundry profession. He has tried many *crazy* ideas. The majority did not work, but every now and again a screwball idea pays off. (An industrial long shot to you.)

A few typical examples are presented here. The author hopes that a perusal may prompt other practical foundrymen with screwball ideas to throw them into the general melting pot—THE FOUNDRY—for the general benefit of all earnest students of foundry practice.

Cup, Saucer and Spoon Tribe Has Vanished

A jobbing foundry may be defined as one that never has a dull moment. Often patterns will appear that look impossible to use. With the disappearing of the old "cup, saucer and spoon" molders, ways and means must be developed to actually make these castings and put them into production. Ideas and systems that are devised for solving these problems must be practicable, and they must be possible according to natural laws and reasoning.

One of our first screwy ideas was to produce cores by the "lost metal" process. We received from a customer a corebox that was a *lulu!* It was a corebox for a pump propeller. The aluminum vanes were to be rammed up in the core. A cheek of molding sand was used for the drying bed. A plate was placed on this, and the core was then rolled over so that the aluminum vanes could be worked out. But the trouble was—the vanes wouldn't come out. They were twisted and back-drafted and would tear up the core.

The customer informed us that the last foundry to handle the job, in a different part of the country, made the cores by baking the vanes in the core and then tapping them out. We tried that scheme, but, even with cores almost as hard as portland cement, we couldn't get the vanes out without breaking the core or spoiling the aluminum vanes. Because of this trouble we developed the idea of using a process that might be compared to the lost wax process.

Using the aluminum vanes as patterns, we made castings from a low melting point alloy that contained bismuth, tin and lead, and which melted at about 300° F. The shrinkage was so small that the castings could be used in the place of aluminum for the corebox inserts. These castings were rammed up in the corebox, but a drainhole was placed in the bottom of the plate. When the core was rolled over and the corebox withdrawn, the core was placed immediately in the oven. After the core began to bake and the temperature of the core became greater than 300° F, the vanes began to melt. The metal was caught in a bucket below the coreplate.

Cores made by this method were very satisfactory. There was a little loss, but not too great, in the expended metal. The metal was fluxed with rosin to clear it for use again.

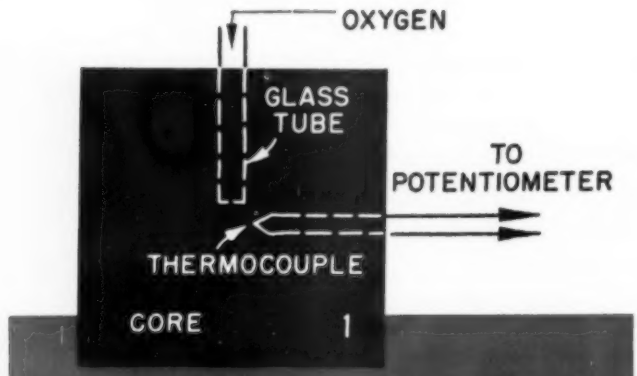
Our customer has used this method for making many pump parts, and it opens a field for making castings that otherwise might be impractical or require very complicated cores.

Another idea was motivated by the need for stepped-up production.

Aluminum spacer rings had to be made from soft aluminum, and they had to be made at a very low price because of competition. The conventional single mold process was too slow. At first we made the rings by the stack-mold process, which produced a large quantity, but the quality was poor because the necessity for soft ramming made swells and buckles. Then we conceived an idea of a semi-permanent mold, and the results were amazing. We produced even more rings than by the stack molds, and the castings were acceptable and better.

Since the bottom face of the rings was flat, we rammed up the rings in a half flask with a center sprue. The flask was lifted off the pattern, and set down in the same position on a flat steel plate. The flask then was removed. The plate was about ½-in. thick, and was well ribbed and reinforced by welded cleats on the bottom to prevent warpage. The plates served as drags and also produced a well chilled structure in the metal. We believe that this system could be adapted to many uses where the metal will lie against a chill.

Our latest crazy idea (*Please turn to page* 238)



FACTORS INFLUENCING Core Baking

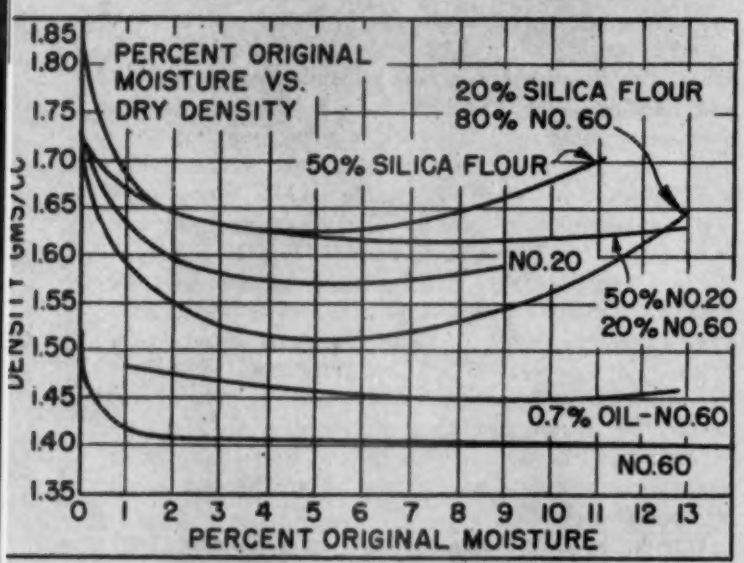
By E. C. TROY*

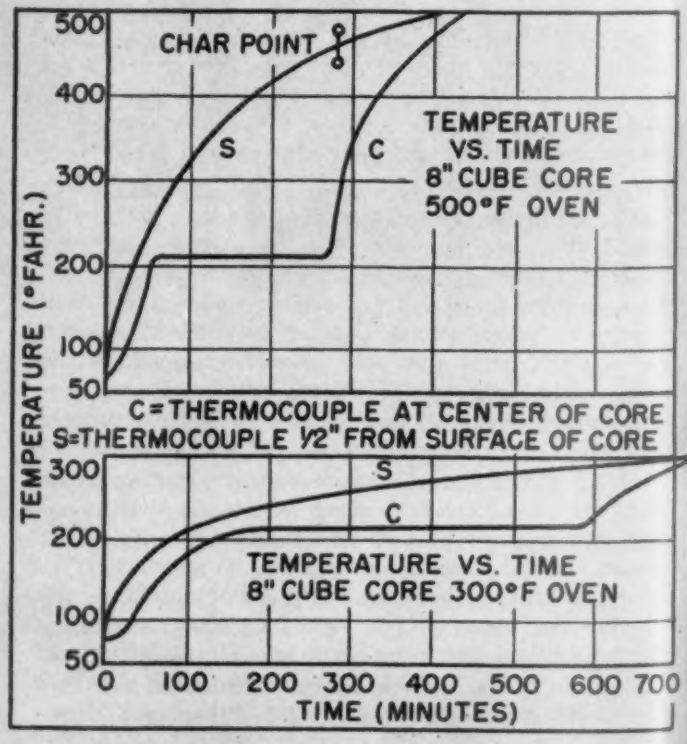
CONSIDERING the importance of proper technique in baking sand cores, it is remarkable that so little quantitative information on the subject is available. Cores are baked to impart properties desirable in a refractory sand surface in contact with molten metal. These properties vary somewhat in their intensity, dependent on the type of metal and casting design. The general fundamentals to be regarded in baking are the same for all metals and all types of castings. The objectives of core baking are two, removal of water and hardening or setting of the binders.

Water Removal—Water removal is accomplished by evaporation. The evaporation rate of water is directly related to the temperature of the core and the temperature, pressure and humidity of the gases in the oven about the core. Increased temperature, lowered pressure and humidity will induce more rapid evaporation. Various mechanical factors also play a part.

Oven Conditions: Since the conventional core ovens operate at only one pressure, approximately atmospheric, there is no point in discussing pressures. The humidity conditions in core ovens will differ from oven to oven and day to day dependent upon: (1) The type fuel used. (2) The rapidity of gas circulation. (3) The quantity of fresh air, in excess of that used in combustion, fed continually into the system. (4) The humidity of the fresh air added.

Fuel: Since the by-products of the combustion of the fuels are in part water the fuels used will add water to the hot gas system. It has been customary to choose fuels with regard to ease of procurement, combustion control, and handling rather than with regard to maximum efficiency from the point of view of more rapid drying. Generally the fuels easiest to handle and control are the most economical in the overall picture. It is unfortunate that while gaseous





fuels are the cleanest and easiest to handle and control, they produce the most moisture as a by-product per unit of heat. In order of their moisture to heat production gaseous fuels produce the most moisture per unit of heat with oils producing less and coal producing by far the least.

Circulation: The influence of gas circulation in the core oven is easily visualized. Anyone acquainted with the evaporation of water has witnessed the greatly increased rate induced by the movement of air over a moist surface. This phenomenon is so commonplace that almost subconsiously one blows or fans an object to dry it more rapidly. As the water at the surface of the core evaporates it is necessary that the water vapor be removed before further evaporation can take place.

If forced circulation is not employed, the movement of the water vapor from the surface of the core is slow, being dependent on diffusion or convection currents induced by density variations in the oven's gases. It should be pointed out, however, that once the gases in the oven system become saturated with water vapor, circulation will be of little avail in removing further water. Fortunately, saturation is dependent on temperature of the gases, and so long as the oven temperature is rising, the saturation level for water vapors increases. Fortunately too, the average oven has some leakage about the doors which allows the exit of saturated gases and entrance of fresh air. The well designed oven using forced circulation feeds fresh air into the system at a controlled rate while removing saturated gases at the same rate through a vent.

Fresh Air: Fresh air going into the combustion chamber or fed into the system will vary with the external atmospheric conditions. During wet humid weather the new air entering the system will carry more moisture and will reduce the effective drying rate over the same air entering in a dry condition. The feeding of fresh air is advantageous regardless of its relative humidity, since the moisture it carries at atmospheric temperatures is much less than it can carry at the elevated temperatures inside the oven. While actual tests have not been made on the effect of the atmospheric conditions, the core oven tenders in the writer's shop have frequently reported a slower drying during very humid weather.

Temperature: Increasing temperature results in increasing the evaporation rate of the water. This results from increasing the rate at which heat is conducted into the core, which in turn raises the temperature of the water, increasing its so-called vapor pressure. At the relatively low temperatures of core baking the transfer of heat into a core is accomplished almost totally by conduction. It is well known that the rate of heat conduction is dependent on temperature difference. The greater the difference in temperature between the surface and center of the core the more rapid will be the heat conduction into the core. By maintaining the maximum temperature in the oven just short of that which will destroy the binders in the core the most rapid water removal is experienced.

Once the water in the core arrives at its boiling temperature, 212° F, further addition of heat produces steam. The humidity condition within the oven is of considerably reduced importance after the core reaches 212° F at its center. Water in a teakettle will completely evaporate by continued boiling if a vent is supplied, even though the gas above the water is completely saturated, or is totally water vapor. Fig. 8 shows the effect of higher oven temperature on the rate of temperature rise at the center of an 8-in. cube core. This and other reported tests were made in a

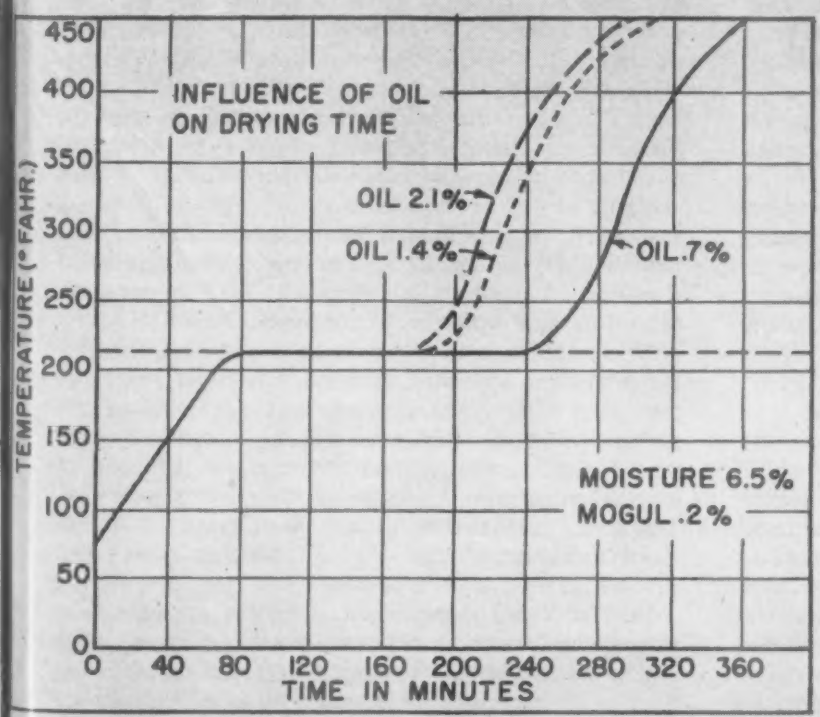


Fig. 1—Method of demonstrating oxidation in an oil sand core

Fig. 2—Relation of moisture to density for different sand mixtures

Fig. 3—Illustrating the lag in temperature rise between surface and center of 8-in. cube cores baked at two different temperatures

Fig. 4—Heating rate of cube core in which oil content of the sand was varied

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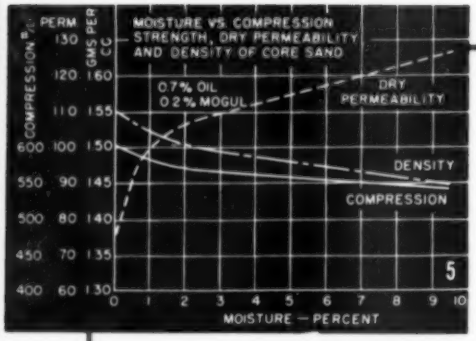
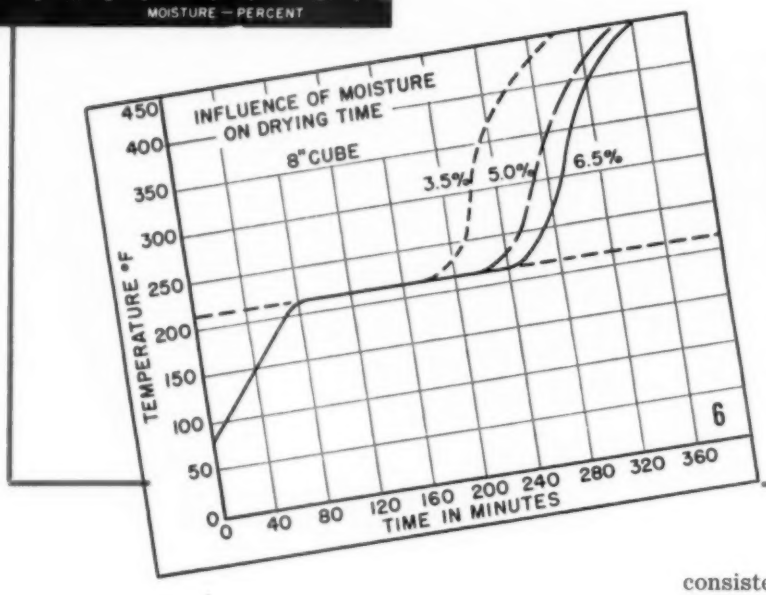


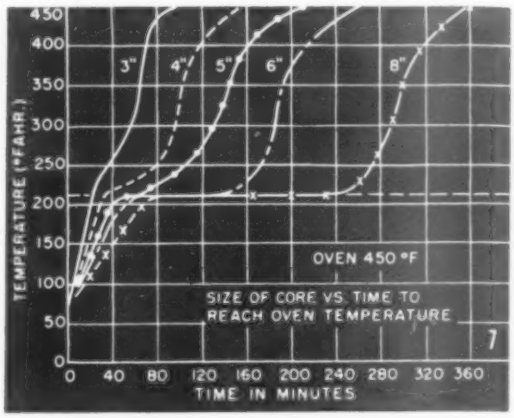
Fig. 5—Chart illustrating influence of original moisture on density of a core when rammed in a uniform manner

Fig. 6—Showing effect on core drying time of varying water content

Fig. 7—Effect of size on time required for a core to give up its moisture. Temperature at the center of cube cores of various size is plotted here against time

Fig. 8—Effect of different oven temperatures on rate of temperature rise at the center of an 8-in. cube core





recirculating gas fired oven.

Increasing the oven temperature does not increase the rate of water removal in a direct proportion, as can be seen on examination of the curves; 90 minutes less time was required to remove water at 450° F than at 375° F, and 140 minutes time was saved at 525° F. The minutes saved per degree rise in oven temperature was greatest between 375° F and 450° F. It will be noted that the 375° F oven test produced a temperature of 410° F at the center of the core. This is not an error, but will be explained later in the text.

Summing up the oven factors promoting the most rapid rate of water removal in order, they are: (1) Maximum oven temperature compatible with the core binders used. (2) Rapid circulation of the oven gases which promotes maximum evaporation rate from the surface of the core in the early stages and maximum heat transfer to the core surfaces and thus internally after the water in the core reaches the boiling point. (3) Venting off saturated gases and replacement with unsaturated fresh gases in the early stages of water removal.

Core Conditions: The major factors in the core itself which alter the rate of water removal are: (1) Size of the core. (2) Original moisture content. (3) Density of the rammed sand core.

Core Size: It is of course obvious that a larger core will take longer time to give up all of its moisture. The extent of this variation is illustrated in Fig. 7 where cores of the same sand mixture were made up as 3, 4, 5, 6 and 8-in. cubes and dried in a 450° F oven. The temperature at the center of the cores is plotted against time. Table I shows these results more plainly. Data on the 6-in. cube are not consistent with the trend of the balance of the data. This is probably an experimental error. Simple thumb-rules will not hold. The larger core takes longer time per inch thickness, but more water is removed in the same time.

Moisture Content: The quantity of original water in the core influences the rate of water removal in three ways: (1) More water requires more heat units for removal. (2) Variation in water content will alter the density and thus the conductivity of the rammed core. (3) Variation in water content will alter the heat transfer rate because of its own conductivity value. The evaporation of water is costly in heat units. While it takes approximately 142 Btus of heat to raise the temperature of a pound of water from 70° F to its boiling temperature, it requires 970 Btu's to change the pound of water to steam vapor. Fig. 6 shows the effect of increasing the water content.

Density: Fig. 5 illustrates the influence of original moisture on the density of the core when rammed in a uniform manner. The results of Fig. 5 were obtained by uniformly ramming a standard 2-in. diam AFA specimen to approximately 2-in. in length. The weight of the specimen, less the calculated weight of contained water, was divided by the volume of the green specimen after ramming to obtain an estimated dry density. Note the marked influence of original moisture percentage on the properties shown. Ten rams, rather than three, were used to obtain more uniform results. Three rams results in even greater differences in properties.

In Fig. 2 are shown some densities against moisture for different compositions measured by the same means as in Fig. 5. It should be noted that the influence of moisture is greater on some blends of

TABLE I—Effect of Size on Rate of Water Removal from a Core

Core Size	Time to Reach 220° F. at Center	Thickness	Cu in. Sand	Minutes per in. to Center	Cu in. per Minute to Center
3" x 3" x 3"	27 minutes	3"	27"	27/3 = 9	27/27 = 1.0
4" x 4" x 4"	45 minutes	4"	64"	45/4 = 11.2	64/45 = 1.4
5" x 5" x 5"	70 minutes	5"	125"	70/5 = 14.0	125/70 = 1.8
6" x 6" x 6"	150 minutes	6"	216"	150/6 = 25.0	216/150 = 1.4
8" x 8" x 8"	245 minutes	8"	512"	245/8 = 30.6	512/245 = 2.1

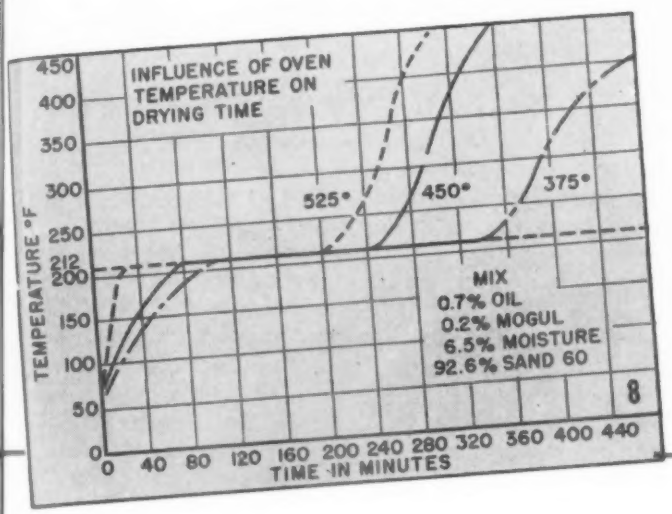


TABLE II—Effect of Changes in Binder Composition

Material	Standard	B	C	D	E	F	G
	(Per Cent by Weight)						
Sand #60	92.6	92.1	90.7	92.6	91.2	92.0	91.5
Water	6.5	6.5	6.5	6.5	6.5	6.5	6.5
Cereal	0.2	0.7	2.1	..	..	0.2	..
Core oil	0.7	0.7	0.7	..	..	..	0.7
Resin	..	..	..	0.7	2.1	1.3	1.3

Effect of Changes in Grain Size and Addition of Inorganic Binder

Material	Standard	H	I	J	K	L	M
Sand #60	92.6	..	92.6	46.3	72.6	86.9	37.75
Water	6.5	6.5	6.5	6.5	6.5	6.5	6.5
Cereal	0.2	0.7	0.2	0.2	0.2	0.6	..
Core oil	0.7	0.7	0.7	0.7	..	..	..
Sand #20	..	91.6	..	..	..	..	37.75
Silica flour #140	..	..	20.0	46.3	20.0	..	..
Bentonite	..	0.5	..	..	..	6.0	..
Resin	..	..	..	..	0.7	..	..
Natural clay	..	..	..	..	..	..	18.0

grain sizes than on others. The designations No. 20 and No. 60 refer to AFA average grain size, while silica flour used was 98 per cent through 140 mesh.

Fig. 2 shows that a core sand containing core oil will ram to a higher density level than one without core oil. In Fig. 4 is shown the heating rate of the 8-in. cube where the oil content of the sand was varied. The more rapid rate of heating can be explained as due to the marked difference in density noted in the higher oil sands. While the higher oil content cores take longer time to complete the setting of the oil, the time to remove the water is shorter.

Composition: The influence of other changes in composition were checked and are, for simplification, reported in tabular form. Using the standard mixture of sand shown in Fig. 8, the 8-in. cube, and an oven temperature of 450° F, the mixtures of Table II are reported against the standard mixture in percentage of time to reach 220° F in Table III. The most striking result is noted when resin is used. In all cases the resin markedly hastened the water removal. Changes in cereal addition seemed to have little influence. Increasing the grain size markedly reduced the time to remove the water.

Increasing the amounts of fines by the addition of silica flour also reduced the time. It is interesting to note that adding fines reduced time. This can be explained by examination of the density values in Fig. 2. Note that at 6.5 per cent original moisture the density of the 20 mesh sand is higher than either the 20 per cent silica flour and 60 sand mix, or the 60 sand with its 0.7 per cent core oil. This then, rather than the porosity of the sand, is the explanation for the rapid removal of water. It is unfortunate that there is no density value for mix "M" to report. It is probable that due to the high green strength of this mix the lowered flowability offsets the increase in density to be expected in the rammed core.

Influence of Mechanical Factors: The influence of core rodding, type of core plate and venting are worth discussion. The standard 8-in. cube of the standard mix was baked under the conditions reported in Table IV. The results of the tests are shown in Table V. It should be noted that all conditions inducing more rapid heat flow into the core speed the water removal, the most effective of these being the presence of core rods and the use of perforated steel plates.

It is very interesting to note that the addition of vents through the length of the core did nothing to aid the removal of water. In fact if enough vents had been inserted the core would have taken longer in reaching 220° F. Vents are frequently added to secure free exit of the moisture. That they can do nothing to hasten the removal of moisture is evident on analysis. Vents which interrupt the continuity of the sand, interfere with the heat flow, since the air that fills them will be lower in conductivity than the sand it displaces. As far as the water removal is concerned the use of vents does little good unless the core being baked is so dense that the water in going to steam could not get out without cracking the core. Such a situation would rarely arise in conventional coremaking. Vents may help the oxidization of the core oil in a very dense core.

Hardening or Setting the Binders—The setting of the binders follows water removal. Different binders are set by different mechanisms and at different temperatures. Inorganic binders such as clays and cements will be left out of this discussion. The conventionally used organic (*Please turn to page* 252)

Aluminum

By FLOYD A. LEWIS
Technical Consultant
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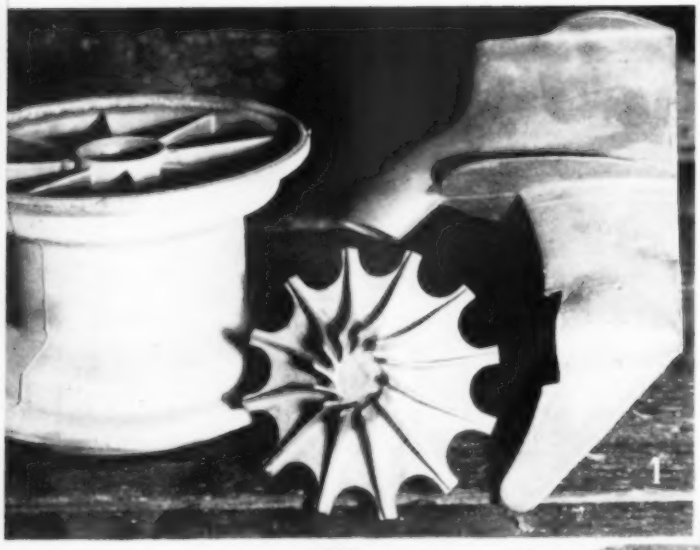


Additional considerations in the design of aluminum alloy castings are discussed here in the seventh of a series of articles based on a survey sponsored by the Aluminum Association's Foundry Division

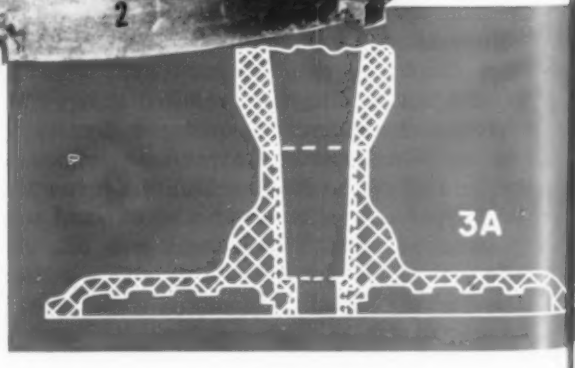


Fig. 1—Various design factors must be considered in producing sound castings of this type

Fig. 2—This rubber tire mold is an aluminum casting weighing 640 lb

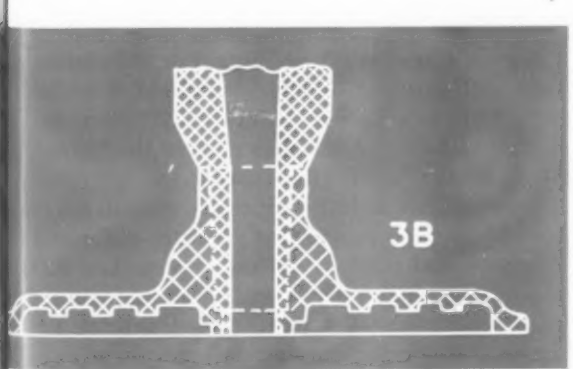
Fig. 3—When made as at *A* this casting developed leakage under pressure. Although the design of *B* involved more machining (heavy shaded portions), it provided improved feeding of the casting's heavy sections and eliminated the leakage

Alloy Castings

IN addition to the design considerations already discussed (THE FOUNDRY, May), other characteristics of the permanent mold method must be considered when that casting process is used. The mold and its arrangement of gates and risers are not subject to alteration after the mold has been constructed, except at considerable expense. Therefore, it is important that the design engineer have a clear comprehension of the mechanics of the process so that he can work into the design features that will facilitate the permanent mold casting of the part. Close consultation and co-operation between designer, mold maker, and foundryman is especially important here to be sure that no important point is overlooked.

Permanent molds must be designed so that parting lines permit the proper inflow of metal into the mold by gravity without creating turbulence or hot spots. Adequate risers must be provided to feed the solidification shrinkage of heavy sections in order to minimize the danger of shrinkage cavities. It is also important that when the mold is in operation the mold sections should leave the major portions of the casting surface at angles of from 45 to 90 degrees. This is desirable to prevent undue abrasion of the coating required on the mold interior. If such design is not possible, all surfaces of the mold where severe abrasion takes place must be made accessible so that the coating may be easily renewed.

While the size of casting that can be produced economically in a metal mold is limited by its complexity, permanent and semi-permanent mold castings ranging from 0.05-lb to several hundred pounds have been cast successfully. Complex castings may require such complicated multipiece molds and cores that their production by the permanent mold method is impractical. By careful study, however, the design often may be simplified so that this method can be used advantageously. The use of sand cores in the semipermanent mold process extends the flexibility of the permanent mold process while retaining most of its advantages.



Dimensional tolerances can be held closer in permanent mold castings than in sand castings. Depending on the complexity of the design, the size of the casting, and whether or not the dimensions are across a parting line, tolerances range from 0.02 to 0.05-in. Where closer tolerances are to be met, the design is regarded as special and involves certain restrictions which should be worked out with an experienced permanent mold casting engineer. On medium sized castings without many parting lines it may be possible to hold within minus 0.01 to plus 0.02 in. across parting lines. Across fixed portions of the mold cavity tolerances may be held to plus or minus 0.01 in. Straight cored holes may be held within plus 0.005 to minus 0.01 in. in diameter. Minimum diameter of cored holes should be $\frac{3}{8}$-in., but in some instances $\frac{1}{4}$-in. holes can be cored out successfully.

Designers should not specify closer tolerances than necessary or close tolerances at too many points on a casting. Exceptionally close tolerances and extremely small draft angles can be had only at higher cost and decreased production.

Stress Analysis—In the design of highly stressed castings it is important for most economical utilization of the metal to make a careful analysis of expected operating stresses in various parts of the castings under service conditions. To guard against fatigue failures from repeated loadings at high stresses, stress concentrations must be avoided. The exact locations where these concentrations may develop are difficult to predict.

Until recent years it was necessary to test new designs under service conditions. If and when fatigue failure developed, the design would be altered and retested. This was a tedious, time-consuming and costly process which delayed the commercial introduction of a new casting for a considerable time after its initial design. A brittle-lacquer method of stress analysis called the Stresscoat method, introduced shortly before World War II, has materially remedied this situation. When a casting coated with this lacquer is loaded, cracks develop in the lacquer which give a direct indication of the strain, from which the stresses developed in various parts of the casting may be determined. The closeness of these cracks indicates the relative concentration of stresses.

Although brittle lacquers have been known for many years, their primary (*Please turn to page* 262)

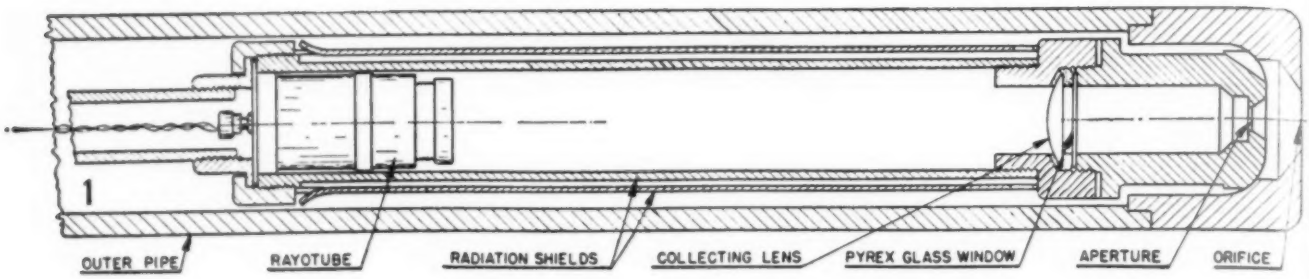


Fig. 1—Section of immersion type pyrometer (Vennerholm[5])

A REVIEW OF Progress in Gray Iron

By JACK H. SCHAUM
National Bureau of Standards
Washington

ALTHOUGH most foundrymen try to keep abreast of the latest technical developments, there are always important matters which escape attention during the passing of a year. This summary of technical articles published during the year 1947 has been prepared so that the reader can quickly be brought up to date on the progress of gray iron metallurgy and foundry practice without the necessity of searching through the many periodicals, books and other publications in which such articles may appear. The most important information contained therein has been carefully extracted so as to require a minimum of effort on the part of the reader. If the digest of an article proves to be of special interest, it can be examined in its entirety by referring to the reference listed in the bibliography presented at the end of this review.

In this resume, the literature reviewed has been grouped under five major headings, namely, (1) Solidification Characteristics, (2) Effects of Alloying Elements, (3) Microstructure, (4) Sand and (5) Miscellaneous.

Solidification Characteristics — The solidification characteristics of cast iron are of fundamental importance in foundry practice and therefore merit considerable research effort. Of interest in this phase of metallurgy is a paper by S. L. Finch, entitled "Some Notes on Feeding"[1]. His description of the mechanics of solidification of gamma iron is especially helpful in understanding certain characteristics of gray iron castings during the process of solidification.

According to Finch, gamma iron (austenite) has an octahedron crystalline form which grows in the direction of the axis of the system and forms a six-branched primary skeleton with circular cross section. In the second stage of crystallization, secondary skeleton branches form from the primary ones and grow parallel to the latter. Meanwhile the branches begin to thicken and restrict the growth of neighbors. If branches thicken as fast as secondary ones form, solidification proceeds as a progressive formation of a solid skin rather than as an extensive skeleton growth of dendrites. This skeleton type of solidification is the most difficult to feed since shrinkage is apt to be interstitial. The skeleton-liquid phase exists between the liquidus and solidus temperature range for solid solution alloys and is nonexistent in pure metals and eutectics.

The furthermost advance of the dendrite arms of the skeleton-liquid phase into the solidifying casting, marks the progress of the liquidus isotherm, whereas the advance of the solid skin marks the progress of the solidus isotherm. Since the skeleton-liquid phase lies between the solid skin and the liquid center of a solidifying casting, its width becomes greater as the difference between liquidus and solidus temperatures increases and/or as the temperature gradient between center and skin decreases. Thus in a casting with large surface-area-to-volume ratio there will be a steep temperature gradient and the "skeleton-liquid" zone will narrow. Similarly any alloying element which decreases the temperature difference between liquidus and solidus will also narrow the "skeleton-liquid" zone in a solidifying casting.

Bastien proved that fluidity improves with narrowing of the solidification range (temperature difference between liquidus and solidus). Thus pure metals and eutectics are most fluid. The greater the amount of liquid present when an alloy reaches the solidus the less the microshrinkage occurring as a result of den-

dritic growth. These two generalizations are substantiated in observations of increased fluidity and easier feeding as the composition of cast iron approaches the eutectic.

A mathematical approach to the problem of feeding castings was attempted by Faber and Doll[2], their object being to present a simple formula or graph for calculating the optimum size of riser, and gate between riser and casting. Although these observations were made on brass, bronze, and aluminum alloys, in plaster molds, the authors felt that the principles could be applied to other metals, mold materials, and casting shapes. The case in its simplest form states that any riser and gate shall be of such size and shape as to provide a continuous flow of heat from riser to casting until freezing is completed. By maintaining a thermal gradient from riser to casting and temperatures of sufficient magnitude along the gradient to permit metal flow, a condition exists which will permit feeding the freezing casting. Guided by these principles the authors developed a series of formulas and curves which permit calculation of size of riser and gate joining it to the casting.

At the 1947 convention of the American Foundrymen's Association, Janco[3] presented a paper describing a simplified technique for calculating sizes of gates and risers. He assumed that all metal poured into the mold arrived there at the same temperature and that the temperature of mold surfaces was the same at all points in the mold. In describing his method the term "cooling factor or C. F." is used, and

$$\text{C. F.} = \frac{\text{Area of section of casting}}{\text{Perimeters of section of casting}}$$

The C. F. value is a relative measure of the time required for the casting to lose heat to its surroundings, or how quickly the metal will solidify. For a gate or riser to supply feed metal, its C. F. value must be larger than that of the casting. Thus the C. F. value of a ring casting having 12-in. OD, 10-in. ID, and 2 in. high would be $= \frac{2\times1}{1+2+1+2} = 0.333$. This C. F. value of 0.333 is set equal to $\frac{A^2}{4a}$ for a square cross-sectioned gate or riser. Solving for "a," the cross-sectional dimension of the gate or riser equals 1.33 in. square. The riser is made sufficiently high to contain about 10 per cent of the weight of the casting and gates. In the case of complex castings the calculations are made using the dimensions of the heaviest section or sections.

The last few years considerable emphasis has been placed on the principles of directional solidification when gating and risering castings. Heretofore the influence of convection currents in determining the pattern of solidification had been given little consideration. However, the importance of this influence was revealed by Schaum in his work at the Naval Research Laboratory on "Convection Currents in Gray Cast Iron"[4]. The presence of these currents was proved by placing thermocouples along the vertical axis of a bottom-poured mold and observing the flow of hot metal from the bottom to the top with the aid of a high-speed recorder.

From a number of experiments the author was able to conclude that, (1) If gray iron castings are bottom poured sufficiently hot (depending on cross section and height) to allow convection currents to take effect before cooling below the liquidus temperature, the hottest metal will flow from the bottom to the top before solidification begins, and (2) When the

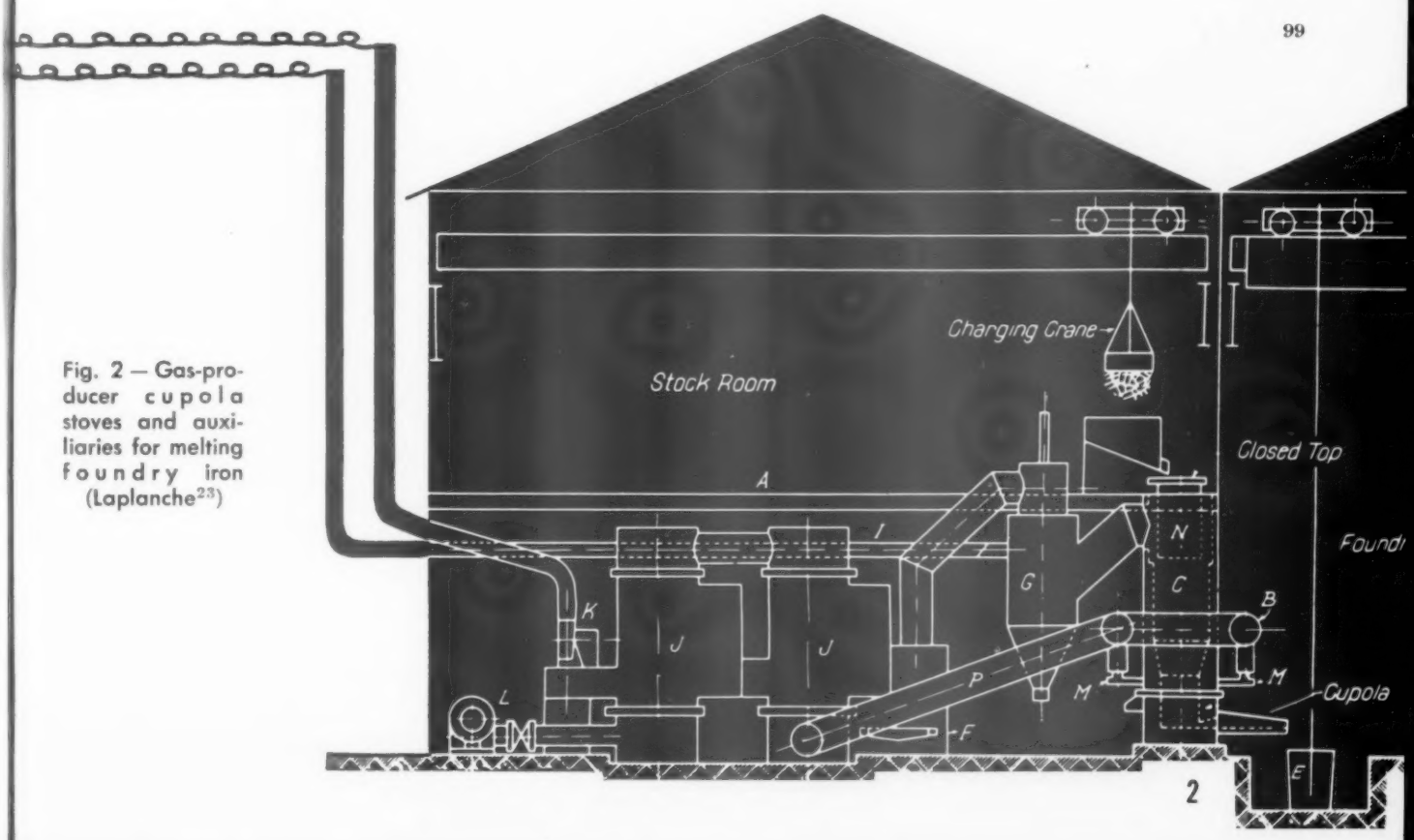


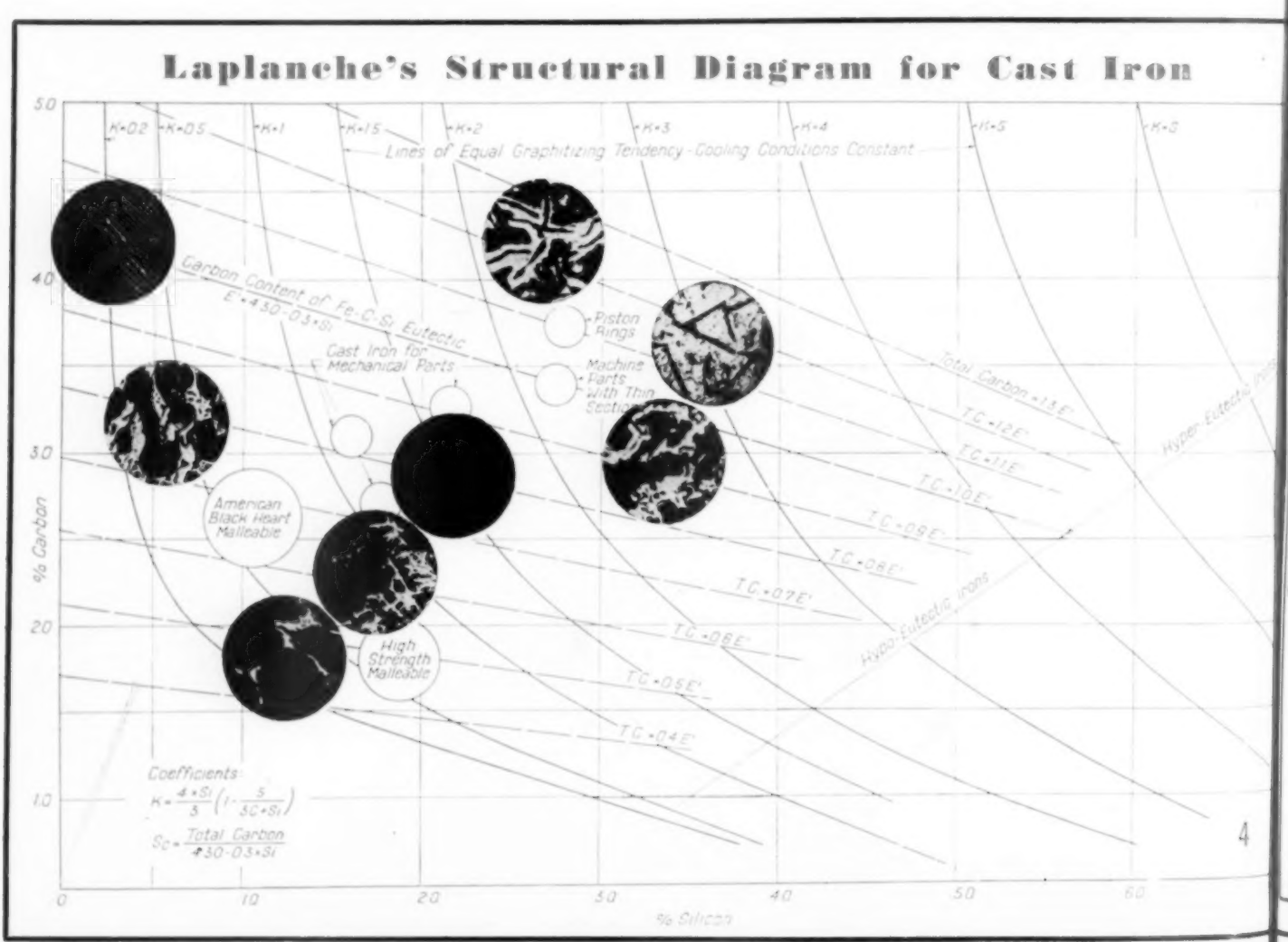
Fig. 2 — Gas-producer cupola stoves and auxiliaries for melting foundry iron (Laplanche[23])

temperature of gray iron has dropped below the liquidus, the metal acts essentially as a solid and convection currents cease to act.

The successful application of many of the principles of solidification depend on accurate measurement of pouring temperatures. Dependable temperature readings are also necessary for proper control of chemical reactions in melting operations. Vennerholm and Tate wrote an appropriate review of this subject entitled "Determination of Molten Metal Temperatures"[5]. Particular emphasis was placed on the accuracy obtained by using immersion type pyrometers. In one type, shown in Fig. 1, a thermopile with a suitable optical system is mounted close to the orifice of a steel immersion tube and a self recording instrument is attached.

Also recommended was a platinum-platinum-rhodium thermocouple in a silica protection tube which is immersed in the molten metal. An electronic potentiometer can be used for continuous or intermittent temperature recording. Both of these instruments are portable and accurate to within 10°F at 2900°F. Cupola control may be improved by permanently installing such an instrument and obtaining a complete temperature record for the entire heat.

Effects of Alloying Elements—Since the chemical analysis of the molten metal has a major influence on the final properties of the casting, it is not surprising



to find that many of the technical papers have to do with the chemistry of the alloying elements.

In one such investigation, Rehder[6] correlated the published data on the ternary system iron-carbon-silicon and concluded that in the range of zero to 4 per cent carbon and 0 to 4 per cent silicon, the silicon is all present as Fe_3Si dissolved in an iron-carbon alloy. Similarly, phosphorus is in solution as Fe_3P. These observations substantiated the practice of using the formula, Eutectic carbon = 4.30 − .30 (% Si + % P).

Although the practice of adding tellurium to cast iron has been widespread for a number of years, its use has received considerable publicity only recently. The powerful carbide stabilizing influence of tellurium is useful in the production of white and chilled iron castings. The chemistry and metallography of this hardening effect of tellurium were clearly revealed in H. Morrogh's "A Note of the Mode of Occurrence of Tellurium In Cast Iron"[7]. From the evidence produced in the paper it was possible to draw the following conclusions:

1. If cast iron contains sufficient manganese to balance the sulphur, tellurium additions will form manganese ditelluride ($MnTe_2$) which appears either as a light dove-gray phase or as a eutectic with manganese sulphide.

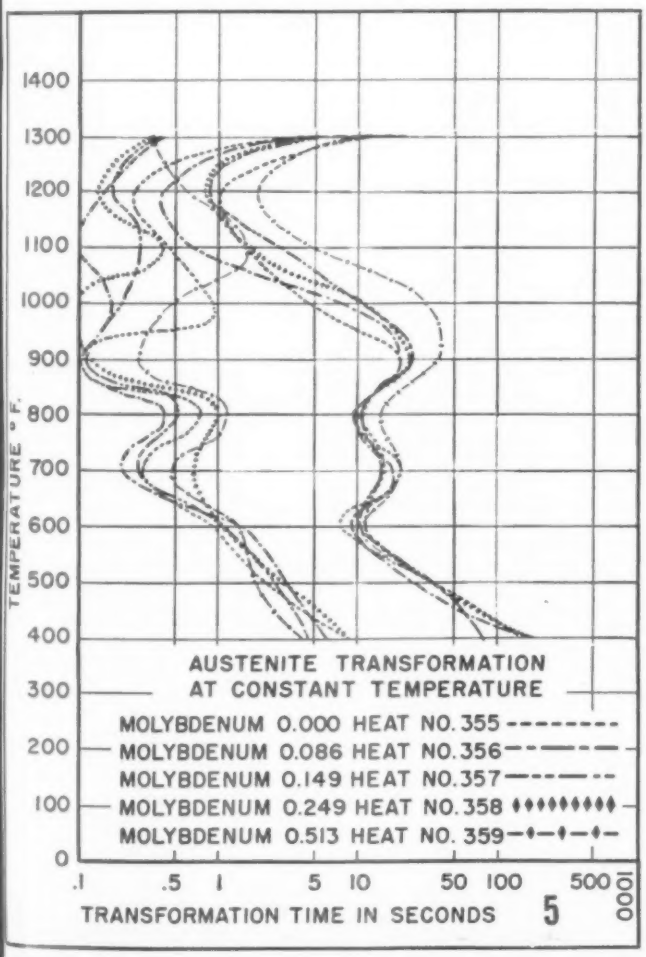
2 . With insufficient manganese to balance the sulphur, iron telluride (FeTe) and iron sulphide may form and materially affect the composition.

3. Tellurium differs from sulphur in that it behaves as a carbide stabilizer even when combined with manganese.

W. P. Sullivan[8] described a unique use for tellurium in a core wash mixture containing 400 grams of tellurium powder, 500 grams of blacking, and one quart of water. This was applied on mold or core surfaces to induce localized chilling action for the purpose of improving pressure tightness by eliminating shrinkage defects and increasing the density of the cast iron. Machining the surface of the casting so treated is not recommended since a chill of about 1/32-in. is usually induced.

Mentioned in the 1945-46 annual report of the British Cast Iron Research Association is a patent application covering the ladle addition of boron and a graphitizer to produce a controlled, finely dispersed, mottled structure.

Because of the possible economic advantages of adding copper-alloy scrap instead of pure copper shot as a source of copper for alloy cast iron, Rose and Lorig[9] conducted an exhaustive investigation of the harmful effects of other metals which are apt to be present in this type of scrap. Varying amounts of aluminum, antimony, arsenic, beryllium, bismuth, cadmium, lead, tellurium, tin and zinc were added to a base iron containing es- (*Please turn to page* 240)



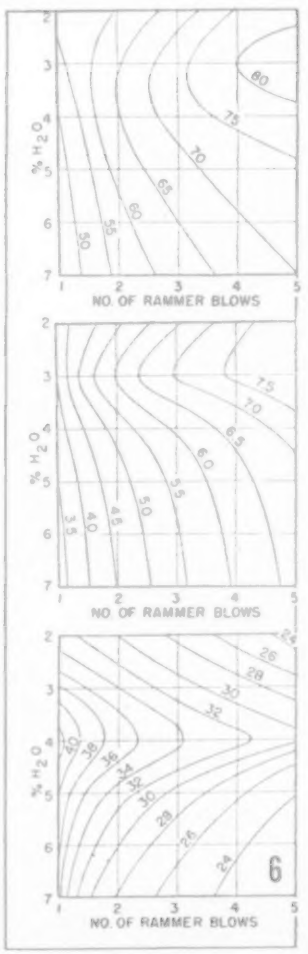


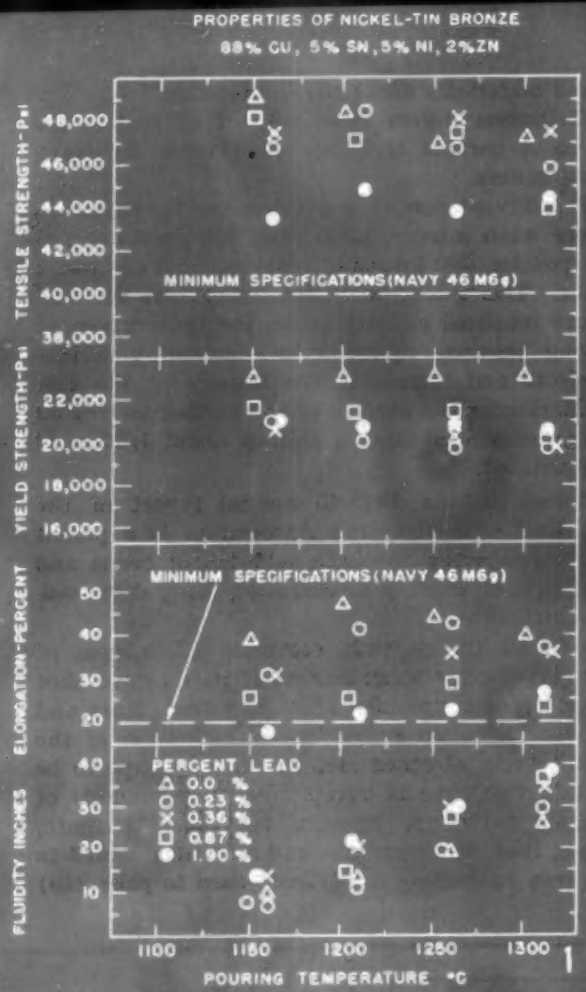
Fig. 3—(Above) photomicrograph, 100X, unetched; (Below) microradiograph 30X of same gray iron specimen (Salkovitz[14])

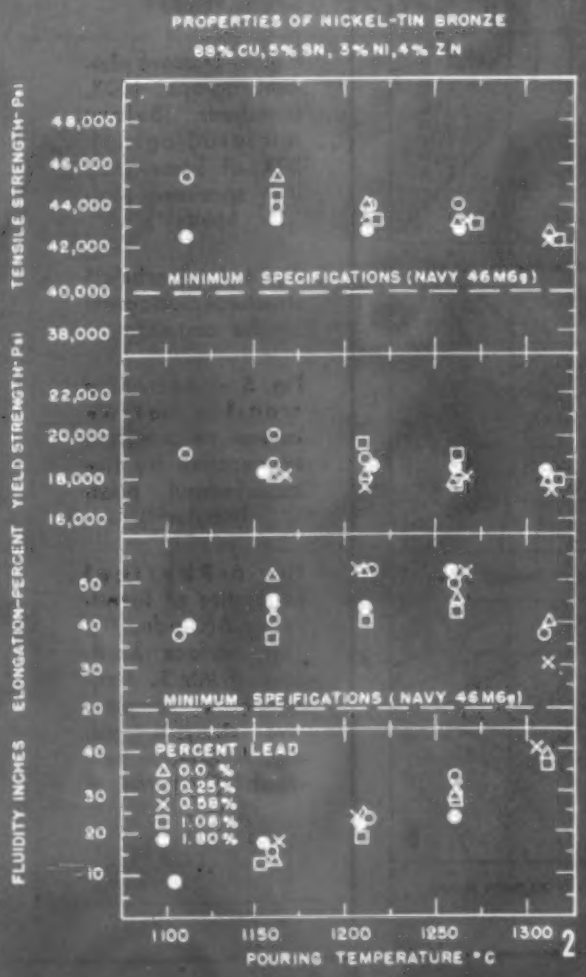
Fig. 4—Laplanche's[16] structural diagram for cast iron

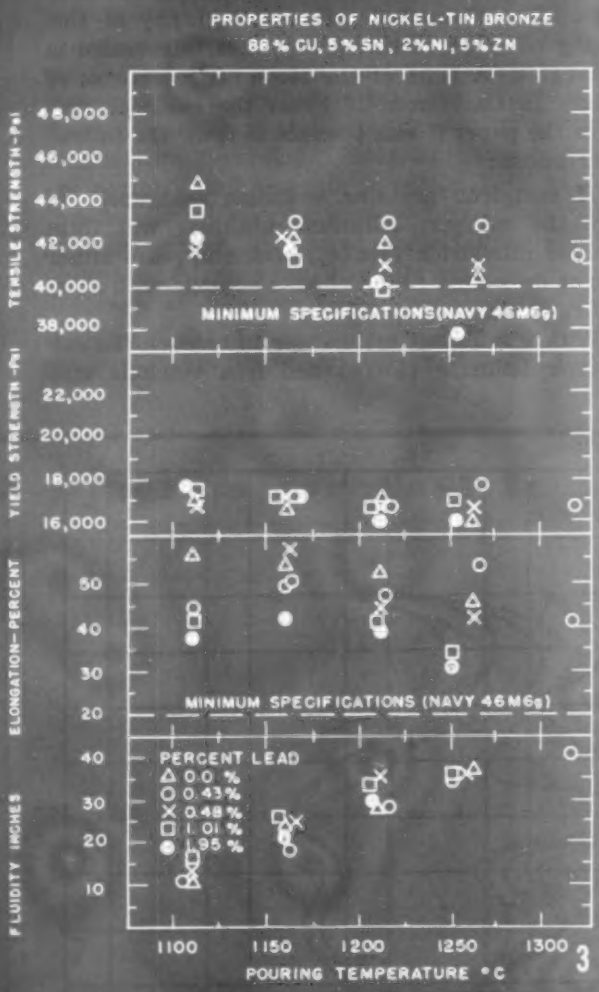
Fig. 5 — Austenite transforamtion curves at constant temperature for five experimental heats (Nayler[10])

Fig. 6—Physical properties of foundry sand (Gardner[20]). Top: surface hardness of Mix 1. Center: green compressive strength, psi, Mix A. Bottom: permeability of Mix A

Effects of Nickel, Zinc and Lead Additions to 5% TIN







By RALPH L. FOX JR.*

BRONZE

WHEN the supply of tin in this country became seriously depleted during World War II, immediate attention was given to bronze alloys containing less of this scarce element. It was soon found that bronzes containing less than about 5 per cent of tin did not possess sufficient resistance to corrosion to permit further consideration. The work described here was concerned with nickel and zinc as possible substitutes for tin in gun metal of composition 88 per cent Cu 8 per cent Sn and 4 per cent Zn. An important feature of this investigation, apart from the mechanical properties, was the determination of the relative pressure tightness of the various alloys.

The three bronzes selected for investigation had the following nominal compositions:

Cu	Sn	Ni	Zn
88	5	2	5
88	5	3	4
88*	5	5	2

*A well known commercial alloy.

Small amounts of lead, in increments up to 2 per cent, were added to the base compositions to study their sensitivity to contamination by this element. This additional information was believed desirable in view of the fact that alloys at advanced bases are made almost entirely from scrap where no chemical analysis is possible. If the alloys become contaminated with lead, their mechanical properties suffer. Some bronzes are more troublesome in this respect than others, and hence the addition of lead to the base alloys was considered of importance in this investigation.

Twenty-one 200-lb heats of the nickel-tin bronze were made in this investigation. Each heat was poured at four temperatures, namely 1310, 1260, 1210 and 1160°C or 1260, 1210, 1160 and 1110°C, depending upon the probable liquidus of the alloy. Five heats of regular gun metal were made with identical foundry practice for comparison purposes.

The charges were melted under a light cover of charcoal in clay-graphite crucibles in a lift-coil, high frequency induction furnace. Electrolytic copper, Straits tin, zinc, copper-nickel master alloy of high purity and selected Naval Research Laboratory scrap of known composition were used for all heats. The copper was melted first, followed by half the zinc and then all the tin. When the tin had gone into solution, the remainder of the zinc with 10 per cent additional for melting losses was added. About three minutes before pouring, 2½ oz of phosphor-copper (15 per cent phosphorous) per 100 lb were used for deoxidation. If a film of oxides formed on the surface after skimming, more phosphor-copper was added until this film disappeared without further skimming.

The heats were removed from the furnace at 1300 to 1340°C; this temperature range was never exceeded during the melting. At every casting temperature, a type 10A tensile test coupon, a Naval Research Laboratory fluidity spiral (Fig. 4) and two bushings (Fig. 5) for (*Please turn to page* 258)

* *At the time of his death in an airplane accident a year ago, the author was a promising young metallurgist at the Naval Research Laboratory, Washington, specializing in copper-base alloy casting investigations.*

Figs. 1, 2, 3—Effects of various percentages of nickel and zinc on a bronze containing 5 per cent tin

Fig. 4—Fluidity spiral and standard Navy tensile test coupon, Type 10-A

Fig. 5—Experimental bronze bushing for pressure testing

NEW ALLOY FOUNDRY TYPIFIES modern

By PAT DWYER
Engineering Editor
THE FOUNDRY

Design

MAGNIFICENT new $3,000,000 plant recently erected, equipped and placed in operation by the American Brake Shoe Co.'s Electro-Alloys Division in Elyria, O., reflects the combined and distilled experience of scientists, engineers and foundrymen over a period of many years. Founded in 1902, American Brake Shoe Co., with ten divisions and four foreign subsidiaries, operates a total of 60 plants, including 40 foundries. It is a member of 42 communities located in 21 different states, Canada and France. In the words of William B. Given Jr., president of the company, the company's business boils down to this: "Brake Shoe is enlisted in a war on *wear*. For years it has accepted the challenge of industries which need parts that will last longer, whether the *wear* battle is against vibration, impact, friction, abrasion, corrosion or high temperature with heavy loads. Our greatest satisfaction comes when we can produce a part that will take greater punishment."

Since the war the company has engaged in an extensive program of plant modernization and construction. In addition to the Elyria plant the company has built new plants in Niles, O.; Meadville and Meadow Lands, Pa.; Winchester, Va.; and Lindsay, Ontario.

The Electro-Alloys foundry in Elyria was taken over in 1943 by the American Brake Shoe Co., and all alloy castings activities formerly conducted at the company's American Manganese Steel Division, Chicago Heights, Ill., plant were transferred to the Ohio plant, which had been engaged in the production of alloy castings for a period of approximately 30 years. Gradual increase and, in many instances, unexpected demand for castings suggested the advisability of erecting and equipping a large modern foundry. In the final plan the original foundry was integrated as part of the new structure. With new walls, roofs and windows the unit was extended up and down and lengthwise to match the remainder of the building. Then it was provided with all the necessary equipment—grinding machines, tumbling barrels, pressure blast rooms, welding, testing and shipping facilities—and converted into a clean, spacious, adequately lighted and ventilated, chipping and cleaning room.

Ground for the new plant was broken in September, 1945, and construction was completed in July, 1947. Architectural and engineering designing was done by the company's construction and maintenance department. The new plant, with over 150,000 sq ft of floor space, includes the foundry, 280 x 460 ft; a two-story office building; two-story welfare building with lunch and washrooms; a fully equipped dispensary, pattern shop and pattern storage building; a heating plant, and a machine shop. All construction is steel and brick with generous use of glass block. The monitor type roof is covered with precast concrete slabs. In addition to the generous space on all sections of the foundry floor, particularly striking features include the even diffusion of light, the tunnels, pipes and mold and sand conveyors. Sand and dust collectors are located in

Fig. 1—Small molds being poured on conveyor

Fig. 2—Molding stations are served by overhead sand hoppers

Fig. 3—Cranes are available over all floors at the new Elyria, O., foundry of Elecrto-Alloys Division, American Brake Shoe Co.

tunnels under the shakeouts and in the tunnels under the foundry floor.

The plant was designed and built to provide conditions under which workers can use their full production skill to the job. Clean, light and airy, it is equipped with the best means of materials handling to eliminate physical labor. Mechanization is as nearly complete as practicable in an alloy foundry producing miscellaneous sizes and shapes of castings. Six overhead, cab type electric cranes carry the heavier loads. Several lift trucks transport materials from one point to another. The smooth cement floor is serviced regularly with mechanical sweepers.

Dust and smoke are removed by hoods over and under each shakeout station. The air is washed in five separate units. The sludge is deposited in two floor tanks, from which it is removed at regular intervals. Nine power-operated ventilators in the monitor roof remove smoke and gases from above the furnaces and the pouring floors. A complete change of air is effected every six minutes.

Sand conditioning equipment is located near the center of the foundry. From the shakeout stations the sand falls into a long tunnel under the floor equipped with a steel pan conveyor mounted on rocker arm supports. The reciprocating movement keeps the sand moving in a thin layer, toward a second similar conveyor traveling at right angles to the first. The second conveyor carries the sand to an elevator which lifts it to the sand conditioning units. A magnetic belt conveyor mounted above the moving sand layer removes stray gaggers and any small pieces of scrap that escaped the screens at the shakeout stations. The entire installation offers many interesting points of contrast with former units designed for the same purpose. Casual spectators usual-

Fig. 4—Extreme north end of pouring floor

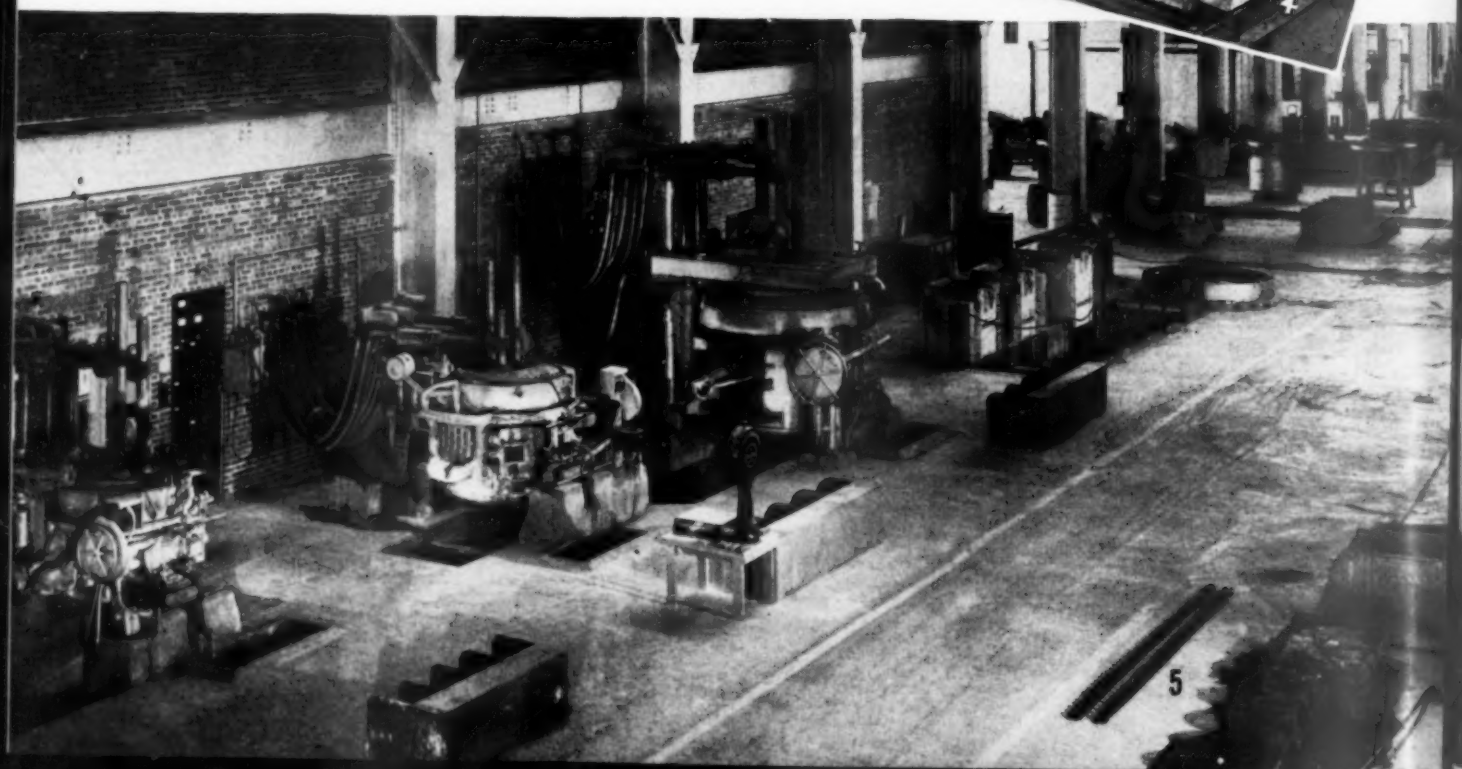
Fig. 5—Melting department is equipped with three electric arc and three induction furnaces, providing combined melting capacity of 12,000 lb per hour

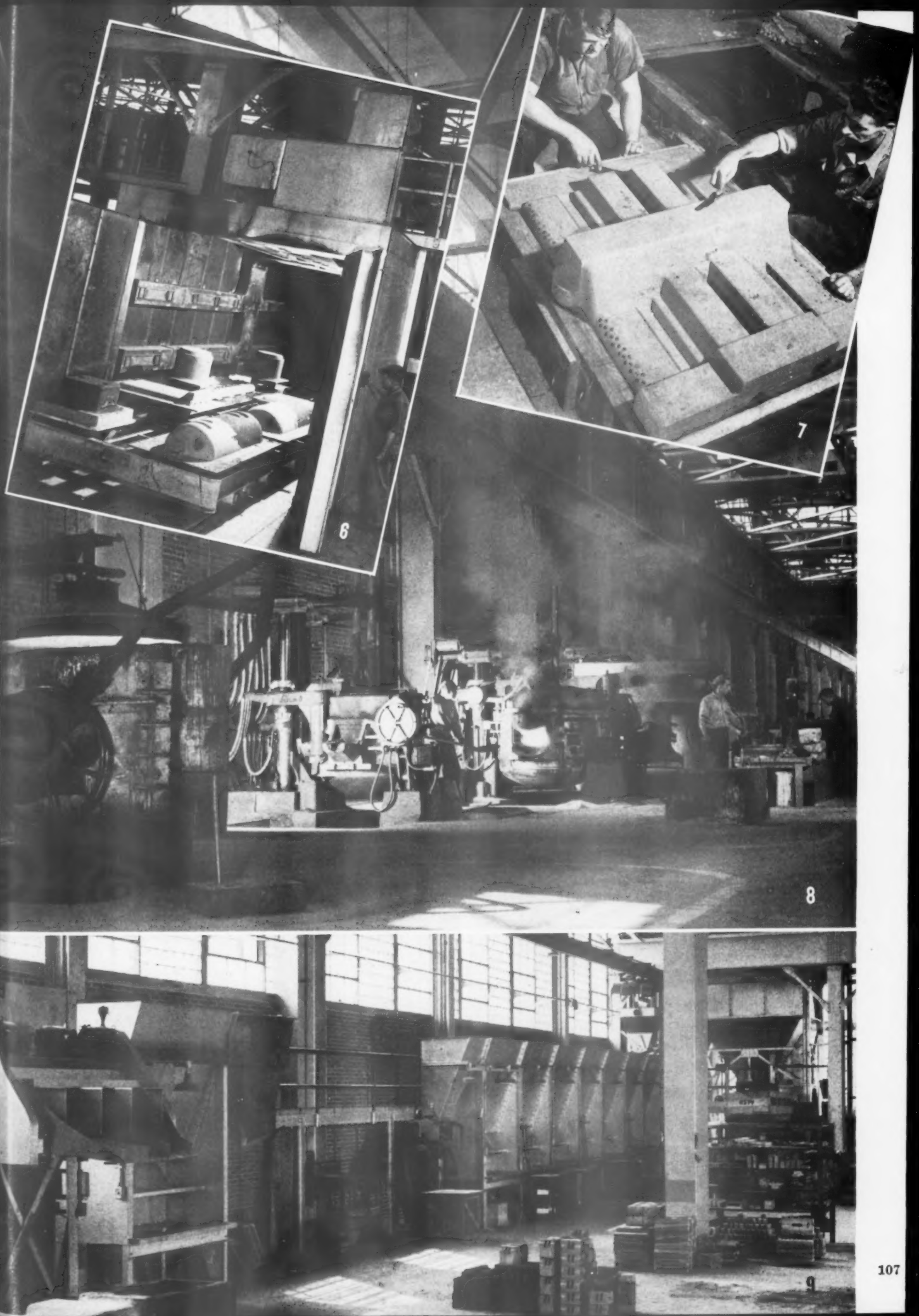
Fig. 6—Car for transporting cores into and out of oven

Fig. 7—Large cores are rammed on machines

Fig. 8—View of melting department. Smoke is removed through the high roof

Fig. 9—Small cores are made on benches

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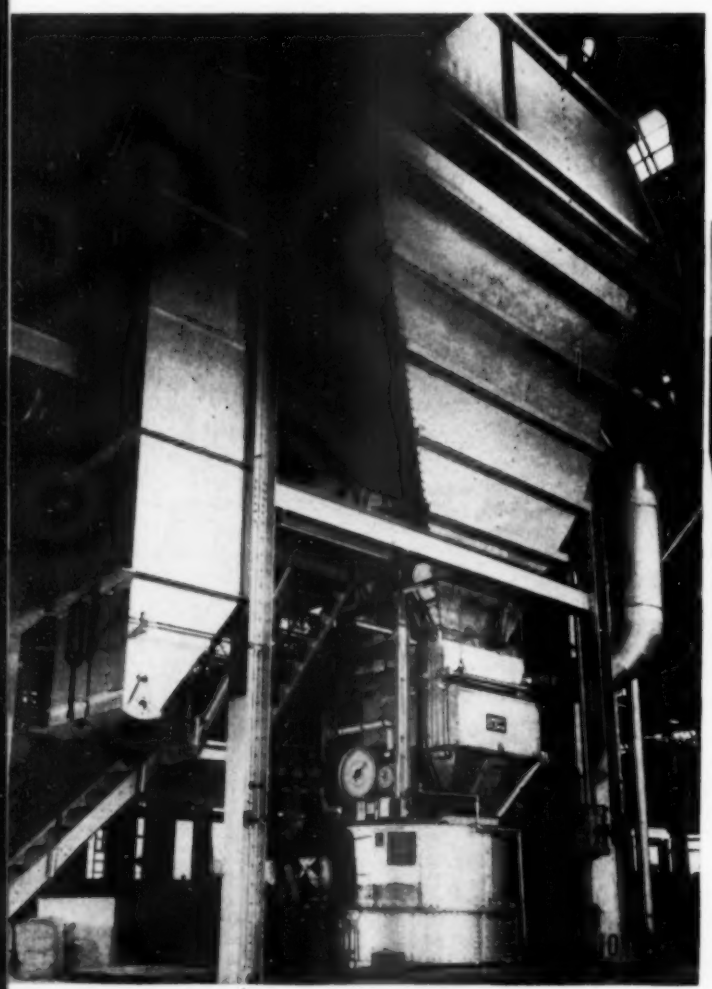
ly are fascinated by the manner in which stray pieces of metal jump out of the sand stream and cling to the cleated belt on the magnetic pulley. This belt, moving at an angle of 45 degrees, discharges over the upper end into a scrap box.

Sand loaded cars enter the west bay of the foundry on a spur track from the New York Central railroad. The track extends at floor level from one end of the building to the other end. At one side near the far end, the sand is unloaded into a series of concrete wall bins. From here it is taken as required to the sand conditioning units which supply the molding and coremaking machines. Typical facing sand mixture contains 650 lb floor sand, 350 lb new sand, 20 lb bentonite, 6 lb cereal binder. AFA grade fineness of the new sand is 95. Moisture content is held to between 3.5 and 4 per cent. From the mixers the sand is loaded on a long overhead belt which distributes the sand to the hoppers over the molding machines arranged in three groups at one side of the center bay. Small castings are made in the first group, medium size castings are made in the center group, and large castings are made in the third section. Molds for many of the large castings are made by a sandslinger near the center of the foundry.

Molds from most of the machines are placed on roller conveyors which carry them to a point where they are filled with metal from ladles suspended from cranes that serve the battery of electric melting furnaces in the center of the east bay. Molds which are set up in deep pits, or which for any other reason cannot be placed conveniently on the conveyor lines, are placed in the pits or on the floor and poured in the usual manner. A buggy on a short transfer track carries the ladle from the first or furnace bay, to the second bay where the molds are set up.

Metal in a wide variety of combinations is melted in a battery of six electric furnaces located near the center of the east bay to facilitate distribution to any point on the floor. Three furnaces are top charge induction type with capacities of 200 lb, 1000 lb and 2000 lb. The other three are top charge, hydraulically controlled electric arc melting furnaces, capacity 1000 lb, 3500 lb and 10,000 lb. An automatic electrical installation controls the furnace operation. Close chemical analysis control and melting flexibility were the primary considerations in the choice of equipment and layout of the melting department. With this flexible furnace department it is claimed there is no delay in the production of either small or large special analysis castings.

Furnace charges are made up in steel buckets and spotted by a crane. The furnace top is swung sideways and the bucket is lowered into the opening. In the loading operation the bottom of the bucket is held in place by a short length of rope. Brief exposure to the heat of the furnace burns the rope. The door swings open and the charge falls into the furnace. The bucket is removed and the top of the furnace is replaced. Alloys are kept in small bins in the vicinity of the fur- (*Please turn to page* 270)



Modern Design

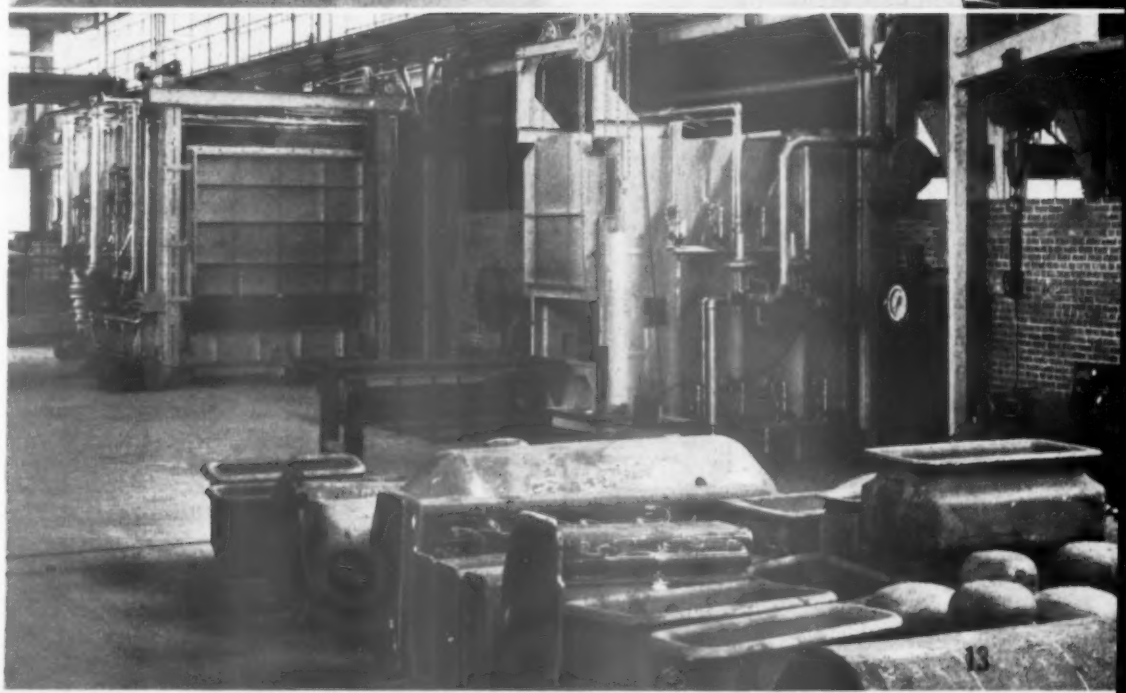
Fig. 10—Sand preparation unit

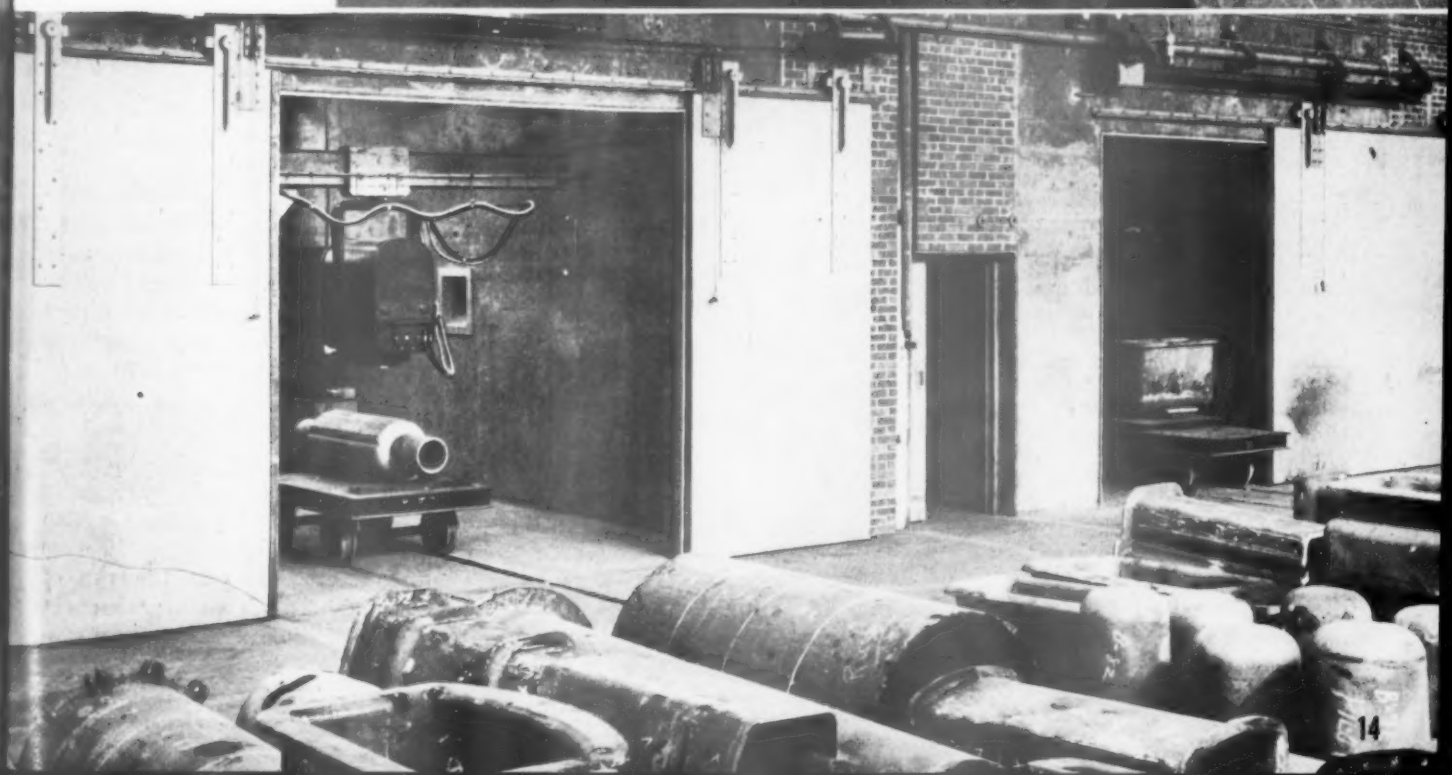
Fig. 11—One of the battery of swing grinders in the cleaning room

Fig. 12—General view of cleaning room

Fig. 13—Heat treating furnaces

Fig. 14—Two x-ray units have combined capacity of 450,000 volts





Questions AND Answers

Copper Castings Are Unsound

Q.—We are making copper hammers and having trouble with the metal absorbing gas. We are using trolley wire, melting it in a gas-fired crucible furnace. We would like to know if any special additions should be made to the metal to prevent copper from absorbing gas.

A.—As you already have learned through sad experience, copper is a prolific gas absorber, and generally some degasifying means must be employed to obtain sound castings. One procedure is to add about 2 or 3 per cent zinc to the copper; the evolution of zinc fumes or smoke carries away the hydrogen which has been picked up or prevents absorption. Another method is to place a small amount of manganese ore or even marble chips in the bottom of the crucible before the metal is put in. Those materials evolve gases when heated and the bubbles passing slowly up through the molten metal carry away the undesired gases.

Other materials include potassium nitrate, 50 per cent potassium nitrate and 50 per cent copper oxide, copper-lithium alloy, copper-boron alloy as well as degassing with dry nitrogen. Additionally there are a number of proprietary materials available from firms whose names may be found in the advertising pages of THE FOUNDRY.

Cast Soil Pipe Centrifugally

Q.—What is the wall thickness of steel molds used for centrifugally casting 4-in. standard soil pipe? We are using one of ¾-in. and find that we lose time in prolonged cooling between casts, and also find that we get a certain amount of warpage which is quite marked in the fluctuations of the top, spring-loaded roller after two or three castings are extracted, and which disappears when the mold is cold. Metal is poured in the mold until about one-half of it is in; then the mold is brought up to 1000 rpm in about 2 sec, and spun for 30 sec. Mold is stopped and pipe extracted. The best we can do for a perfect casting is 60 lb against 50 lb for sand-cast pipe. That brings our pipe into the heavy class. What is the remedy?

A.—Description of your centrifugal equipment for casting soil pipe indicates to us that you are using only one center support, and that is free to move. We believe that you should have two fixed rollers located so that the mold is divided into three equal sections. Also your mold seems too light in section, and should be at least twice the thickness; say around 2 in. If the pipe has a bead on the spigot end, the mold will have to be split horizontally so the pipe can be removed.

The comparatively thin section of the mold permits it to heat up too fast, not to mention that it probably lacks stiffness or rigidity under the conditions of use. We also believe that it will be advisable to employ a thin wash on the metal mold surface which will protect it as well as forming a thermal barrier. A suitable formula according to Udy and McIntire is 400 parts by volume of calcined diatomaceous earth, 24 parts bentonite, 8 parts 17 per cent waterglass, and 400 parts water. Coating on the mold should be about 0.04-in. thick.

It appears to us that your casting procedure of pouring in one-half the metal before starting to spin is not the best practice for the thin section involved. We believe the mold should be spinning when the metal is poured into the mold. You do not mention what kind of a pouring spout you are using, and it is suggested you employ one which extends into the mold a short distance and arranged so that the molten metal is not spilled all in one small area.

In making pipe or tubes by the centrifugal process a definite amount of metal is poured so that the proper thickness is obtained. You mention that you have to use 60 lb of iron instead of a desired 50 lb, and wonder whether you have tried just pouring in 50 lb, and find that it is not sufficient. As previously mentioned, the difficulty may arise from your method of casting.

Reclaiming Cast Iron Borings

Q.—We will appreciate any information on reclaiming cast iron turnings and borings. Can they be melted to any advantage in the cupola? Can they be melted in the cupola, poured into pigs and remelted, or is briqueting the only practical way of handling them.

A.—While mechanical briqueting of borings and turnings probably is the most economical procedure for total recovery of metallic content, a number of other procedures have been employed. For example, D. J. Reese in 1942 mentioned that one foundry was making briquets of 18 lb borings and 2 lb quick-setting cement which were air dried for three days, and used up to 10 per cent of the charge. Another foundry much earlier was shoveling in loose borings as a part of the charge. Reese also suggested that borings and turnings be melted at the end of the day's heat using small coke 1½ to 2-in. size, and pigging the resulting iron.

It is reported that in the 1880's Asa Whitney obtained a patent for enclosing cast iron borings in boxes and melting them, and in 1904 Stanton Griffith hit upon the idea of placing the borings in tin cans for melting. A variation of that was the use of lengths of stovepipe sealed at both ends with sheet metal disks. In 1908 F. H. Prince developed a meth-

od of using sections of 12-in. diam, 22 or 24 gage steel about 3 ft long. A cast iron plate 13 in. diam was placed on the top of the bed coke close to one side of the cupola. A tube or pipe was placed on that and filled with borings, and the iron charge placed around it, followed by the coke split for the next charge. Another section of pipe was added filled with borings, and the cycle followed until tube filled with borings and the charges of coke and iron reached the charging door. Then as they dropped due to melting, tubes and charges were added.

Still another method of utilizing borings is to place a quantity in the bottom of the pig molds for taking care of the over-iron from the ladles. While that iron may not dissolve all of the borings it will cause agglomeration by partial fusion and penetration, producing a mass that can be charged into the cupola.

Has Trouble with Penetration

Q.—We are having trouble with metal penetration, otherwise called "burning-on," on our steel castings weighing from 1000 to 2500 lb each and with metal thicknesses from 6 to 10 in. The trouble usually does not occur on flat surfaces, but on inside corners. We use New Jersey synthetic sand and we would like a suitable sand mix for both green and dry sand facing and cores to eliminate our difficulty.

A.—It is not possible to prescribe exact sand mixes, based on experience in one shop, for use in another without changes made to suit particular conditions of use in the new place. In particular the type of molding equipment used, such as jolters, sandslingers or hand ramming, will make a difference in the results secured with any given mixture. Assuming that you are using all new sand in your facings and that you are buying sands some 75 per cent of which will be found on the 40 to 50 and 70 mesh sieves, the following mixtures should serve as models on which to base your practice.

For facing on dry sand molds or heavy external cores: Sand 2000 lb, silica flour 300 lb, and clay 275 lb. Mix with 5 gal glutrin or equivalent and bring moisture content to about 6½ per cent. Green crushing strength should be about 3 to 5 psi, and green permeability should be about 40 or over. Molds should be washed with a mixture of silica flour, glutrin, molasses or similar material, and either bentonite or one of the proprietary compounds. Cores should be treated similarly.

For backing sand in these cores use a mixture such as follows: Reclaimed sand 2000 lb, clay (dry) 60 lb, and pitch 60 lb. Mix with water and 5 gal of glutrin or equivalent. Bring moisture to about 5½ per cent, and green crush should be about 4 psi.

For green sand facing the following should be satisfactory: Sand 2000 lb, silica flour 80 lb, clay 165 lb, and cereal binder 13 lb. Mix with 1½ gal glutrin or equivalent, bring moisture to 3½ to 4½ per cent, and work for a green crush of about 4½ psi with a permeability of 90 or over. If preferred, 55 lb of western bentonite may be substituted for the clay. As the trouble is with heavy section castings, however, clay is listed as the preferred material since it is usually satisfactory for this class of work.

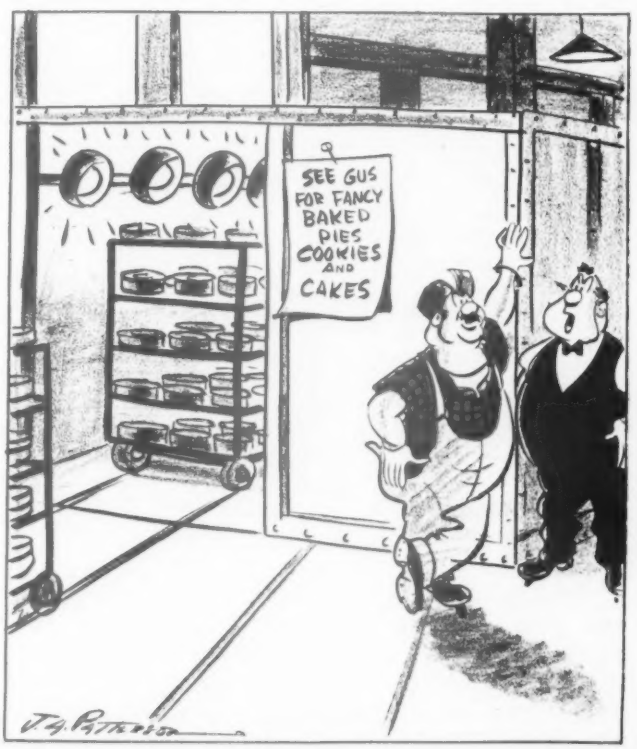
It is assumed that the green sand molds will be air dried for a considerable time, or partially dried in an oven if green sand is to be used to face molds for work as heavy as 6 in. The "strong" sands of south Jersey containing from 15 to 20 per cent clay formerly were employed extensively for dry sand facings for heavy steel castings. A suggested mixture using this material would be as follows: Strong sand 900 lb, washed sand 1100 lb, silica flour 200 lb and clay (dry) 100 lb. Mix with 5 gal glutrin or equivalent, bring moisture to 6½ to 7 per cent. Green strength and permeability should be similar to that given for dry sand mixture using all low-bond sand.

You do not state if you wish to use any internal cores that must be readily collapsible, or if your trouble involves any of the parts of the castings in contact with such cores. Assuming that such is the case, a mixture for core sand that will be resistant to steel penetration, and that can be removed from the castings fairly readily, may be composed of: Sharp sand 2000 lb, silica flour 850 lb, cereal binder 70 lb, and core oil 28 qt. Bring moisture to 7½ to 8 per cent, and aim for a green crush of about 5 psi and permeability of 10 to 20. This core mixture is intended to be very resistant to metal penetration, and to be moderately collapsible. If greater collapsibility is desired, and the metal penetration is not the major consideration, the silica flour and core oil may be reduced to secure the desired results.

Of course, burning on of sand to steel is greatest on the points nearest the gates where the steel flows over the sand for the longest period of time in pouring, and hence heats and softens it to a greater extent than is true of the sand in other parts of the

GANGWAY!

By J. A. PATTERSON



"Gus, what's this I hear about your taking on some sort of a sideline?"

mold. It is assumed that due consideration is being given to locating the gates so that the metal does not impinge upon corners of the mold and cores, and that it has an opportunity as far as possible to flow uninterruptedly over flat portions of the mold. It might be well also to consider the use of gates at several levels in the mold if the shape and size of the castings permit.

Cutting Off Gates and Risers

Q.—We would like to obtain some information on the type of saw blade to give the best results for cutting off gates and risers on No. 108 aluminum alloy, and the proper speed to run the saw.

A.—While some foundries use wood-cutting band saws for aluminum, better results are secured with high-speed metalworking saws. Speeds range from 3000 to 5000 sfm; the heavier the section, the slower the blade speed. Saw blade width, gage and tooth pitch are controlled by thickness of section—blades up to 1½ in. wide, 16 gage and three teeth per in. being used for extremely heavy work, and ½-in. wide, 20 gage and up to eight teeth per in. for light work.

Teeth should not have more than 5° top rake or hook and about 0.015-in. clearance on each side to minimize heating. Too much top rake or hook causes saw to feed into the work too rapidly for hand feeding, and may result in the blade pulling out of the guides. Negative rake should not be used. Cutting oil, stick grease or tallow is used for coolant and lubricant, particularly in cutting heavy sections. Circular saws with tungsten carbide teeth operating at 7500 sfm also can be used.

Putting in the Cupola Bottom

Q.—We would like to obtain as much information as possible concerning the bottom sand for a front slagging cupola, 56 in. ID operating continuously 9½ hr a day. What type of sand is preferable—natural or synthetic? If synthetic, what type of clay? What should be the proportion of old and new sand and what is the best method of mixing—by hand shoveling and riddling or by mulling? Will seacoal, cereal or other organic matter be detrimental? What should be the permeability, moisture and green compression strength as determined by standard AFA procedures? Are dry compression strength, hot strength and fusion point a factor and what should they be? What thickness should the rammed sand be over the doors and how hard should it be as tested by a Dietert mold hardness tester? What should be the pitch from front to back? When the prop is pulled to drop the bottom, should the sand come down with the doors as they open or hesitate momentarily before dropping?

A.—Most of your questions on cupola bottom sand can be answered by quoting from the *Handbook of Cupola Operation* published by the American Foundrymen's Association, as follows:

"Sand for the bottom should be taken from a well-used heap of molding sand to make certain that all organic matter has been burned out. It should be tempered on the dry side as for molding. Sand from slinger floors makes a good bottom sand. A permeability of at least 65, moisture from 5 to 7 per cent with green compression strength of 3 to 6 psi are acceptable properties. The sand should be screened through a coarse riddle, about No. 4, to eliminate sand lumps and pieces of iron or nails that may cause the metal to run through the bottom door. The sand should always be measured either by volume or weight to insure a minimum variation in the capacity of the well. This is essential for consistent daily cupola practice.

"The sand is dumped into the cupola through the charging door and spread evenly over the bottom. It is rammed into a wide fillet against the lining with two or three rammings of the peen end of a hand rammer. The sand bottom is slanted toward the taphole at a slope of about 1 in. per ft, the center being rammed once or twice so that it is not packed so hard that it will not break up easily when the bottom is dropped at the end of the heat. The depth of the sand bottom at the tap hole varies from about 3 in. for a 30-in. diam to about 9 in. for a 96-in. diam cupola.

"To provide a well-vented cupola bottom it is good practice to close the bottom doors as usual, and cover them with approximately 3 in. of crushed slag-fines screened through a ½-in. mesh riddle. The regular quantity of bottom sand then is dumped into the cupola, and spread evenly over the slag cushion. Molding sand screened through a ¼-in. riddle to free it from lumps and particles of iron may be used, and the bottom may be rammed hard to prevent any tendency to wash under the iron flow. The slag cushion provides a perfect vent for the bottom sand and has no tendency to hang up when the bottom doors are dropped."

The foregoing appears to answer most of your questions except those on dry compression strength, hot strength, fusion point, and hardness. We do not have any information on those except that if the properties are suitable for making of castings, the sand will serve for the bottom. As far as hardness is concerned, ramming should not be too hard since it will cause the iron to boil.

Surface Porosity Due to Sand

Q.—We are sending you a small chunky casting made of 85-5-5-5 which shows a porous condition on most surfaces. This also has appeared on other types of castings. We use ingot metal melted in coke-fired crucible furnaces. Runners are cut in the cope with ingates in the drag.

A.—So far as we can ascertain by visual examination, the alloy, melting procedure and gating method have nothing to do with your trouble. It is due to your sand condition, and may result from too high a moisture content or lack of permeability due to too fine a sand or too hard ramming. Of course, there is the possibility that if several castings are made in one flask, they are too close together, raising the temperature of the molding sand so that more steam is created. The steam is unable to escape easily due to the close spacing, and tends to kick back toward the molten or partially molten metal in the casting cavity.

We believe that if you will consider the various factors mentioned, determine the one most likely to be the source, and change conditions to make them more conducive to better results, you will get smooth castings to meet all the conditions laid down.

FOR FASTER, EASIER, LOWER COST FINISHING OF GRAY IRON CASTINGS

'NISILOY'*

(NICKEL-SILICON-ALLOY)

● WHAT IT IS

"NISILOY" is an inoculant with positive graphitizing power. It contains about 60% nickel, 30% silicon, balance essentially iron. Its remarkably low melting point of 1800° F. and relatively high specific gravity causes it to dissolve quickly in liquid iron.

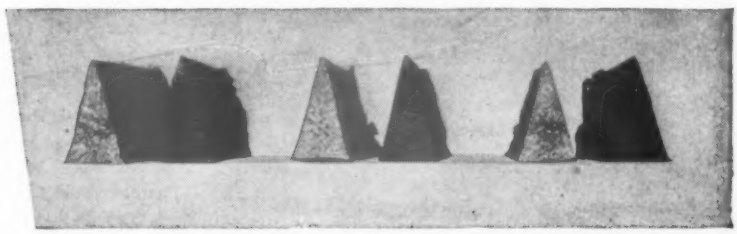
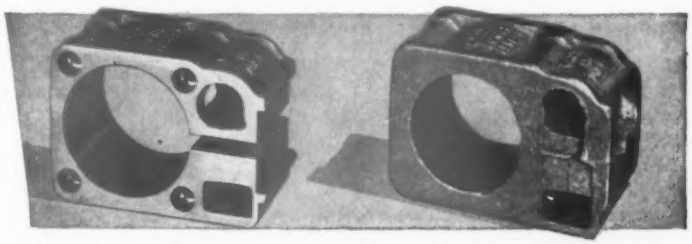


Photo of 1" chill test bars show advantages of Nisiloy. In each pair, wedge on left is white, and was cast without Nisiloy. Right hand wedges used progressively 1 to 1½% Nisiloy. Notice complete elimination of hard white iron on specimen at extreme right.

● WHAT IT DOES

"NISILOY" improves machinability . . . it provides a dense, gray, easy-to-machine structure that reduces machine shop costs.

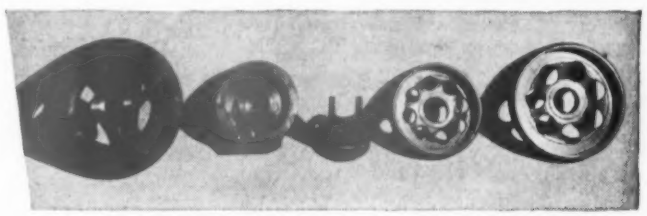


Use of 1% Nisiloy in these cylinder castings eliminated machining troubles from hard spots in light sections, raised output, reduced rejects and cut final costs.

● HOW TO USE IT

"NISILOY" is simply added to the ladle. Additions of from .25 per cent to 1.00 per cent usually prove sufficient for structure control. Improve quality and quantity of your output. Get full information . . . mail the coupon now.

*Trade Mark of The International Nickel Company, Inc.



Nisiloy helps you control properties of gray iron for casting parts with varied cross sections that tend to create chilled surface areas. Its use eliminated machining troubles, and provided a dense, uniform close-grained microstructure in these bonnets, slide valves and bushing.

EMBLEM OF INCO SERVICE
TRADE MARK

Over the years, International Nickel has accumulated a fund of useful information on the properties, treatment, fabrication and performance of engineering alloy steels, stainless steels, cast irons, brasses and bronzes, nickel silver, cupro-nickel and other alloys containing nickel. This information is yours for the asking. Write for "List A" of available publications.

THE INTERNATIONAL NICKEL COMPANY, INC.
Dept.T.F., 67 Wall Street, New York 5, N. Y.

Please send me your booklet entitled, "NISILOY" for GRAY IRON CASTINGS.

Name.....*Title*.....

Company.....

Address.....

City.....*State*.....

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N. Y.

Men OF INDUSTRY

WILLIAM A. HAMBLEY has been elected vice president and foundry manager of Wilson Foundry & Machine Co., Pontiac, Mich., wholly owned subsidiary of Willys-Overland Motors, Toledo, O., in a complete reorganization of supervisory personnel. Mr. Hambley's previous connections in the foundry industry include chief metallurgist of the foundry division, Studebaker Corp., South Bend, Ind.; chief metallurgist, foundries and pattern division, Allis-Chalmers Mfg. Co., Milwaukee; general manager of Slinger Foundry Co., Slinger, Wis., and Falls Mfg. Co., Menomonee Falls, Wis.; and more recently as foundry consultant.

F. C. Miles, former division controller for Kaiser-Frazer Corp., Willow Run, Mich., has been elected treasurer of the company. **A. H. Shepherd,** recently foundry superintendent, Aluminum Alloys Corp., Detroit, and former foundry engineer for Chrysler Corp., Detroit, has been appointed plant engineer. **Henry A. Hyoner,** former service engineer for Smith Oil & Refining Co., Rockford, Ill., and manager of St. Anne Foundry Co., St. Anne, Ill., has been made superintendent of the coreroom. **I. Mutsulavish,** until recently coreroom foreman, American Foundry Co., Indianapolis, Ind., has been appointed assistant coreroom superintendent. **Edwin C. Radtke,** former superintendent of construction, Planet Construction Co., Lansing, Mich., is superintendent of the service department.

Other appointments include: **Theodore G. Gallagher,** recently assistant pattern shop superintendent, Ferro Machine & Foundry Co., Cleveland, assistant general superintendent in charge of patterns and equipment; **Jack Burket,** who has been associated with Ford Motor Co., Dearborn, Mich., for 18 years, superintendent of production; **John Madacey,** recently superintendent of Donovan Inc., St. Paul, assistant foundry superintendent; **Bruce Norman,** previously foreman at Donovan Inc., general foreman; **William Keiser,** formerly foreman at John Deere Tractor Works, Waterloo, Iowa, general foreman of the melting department. Also appointed were **C. Harvey Johnson,** former plant superintendent, Maryland Sanitary & Mfg. Co., Baltimore, assistant superintendent of the second shift; **Chris Cusmano,** former coreroom foreman, Lincoln Brass Works Inc., Detroit, assistant coreroom superintendent, second shift; and **Joseph Rodgers,** former foreman at the Packard Motor Car Co., Detroit, superintendent of the pattern shop.

• • •

J. L. McCloud has been appointed director of chemical engineering and chemical and metallurgical research, Ford Motor Co., Dearborn, Mich., succeeding the late R. H. McCarroll. Mr. McCloud was graduated from University of Michigan in 1913 with a degree in chemical engineering. He joined Ford Motor Co. in 1915, as a chemist at Highland Park and was later appointed chief chemist for Henry Ford & Son Tractor Co. In 1920 he was transferred to the engineering laboratories at Dearborn, and in 1936 joined the chemical engineering department at the Rouge plant. He has been assistant director of chemical engineering and chemical and metallurgical research since 1946.

• • •

Robert L. Ledbetter has been appointed sales representative in Texas and Oklahoma, for the Buckeye Tools Corp., Dayton, O. Mr. Ledbetter will handle sales for the company's pneumatic and electric portable power tools in the territory.

• • •

Wayne H. Gunselman has been appointed general manager of the Nonferrous Division recently created by Buffalo Pipe & Foundry Corp., Buffalo, which will specialize in the production of permanent mold aluminum, brass and bronze castings. Mr. Gunselman, until recently, had been director of research and foundry engineer, Samuel Greenfield Co. Inc., Buffalo. Prior to that he was director of the metallurgical department of the National Bronze & Aluminum Foundry Co., Cleveland.

• • •

Dale D. Spoor has been appointed manager of the equipment sales department, Air Reduction Sales Co., New York. The new department is a merger of the former apparatus sales and arc welding sales departments. **Ira B. Yates** has been named manager of arc welding and supplies sales, and **J. F. Carroll,** manager of apparatus sales. Mr. Spoor, a graduate of Massachusetts Institute of

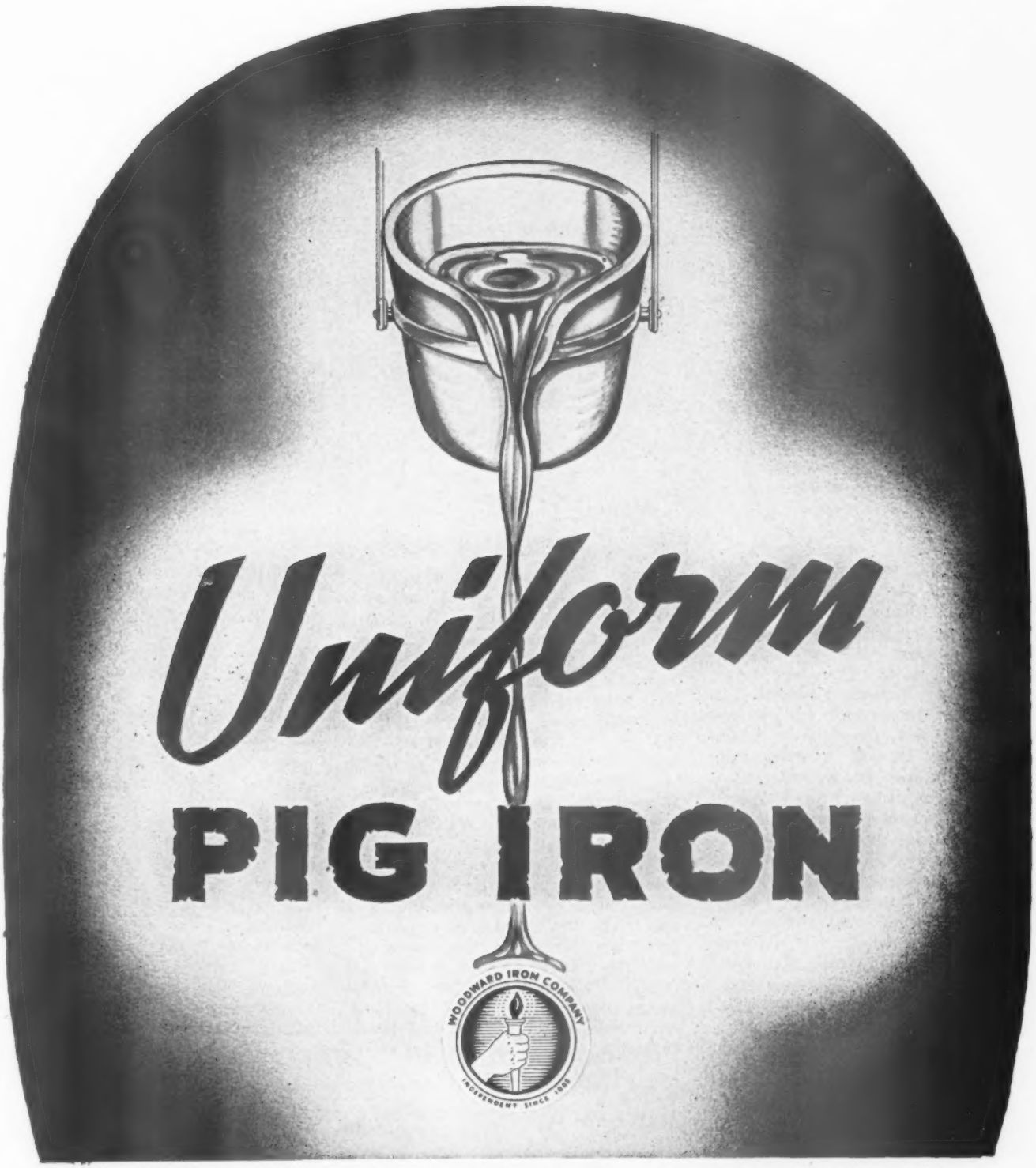
(*Continued on page* 116)

WILLIAM A. HAMBLEY

J. L. McCLOUD

ROBERT L. LEDBETTER

WAYNE H. GUNSELMAN



WOODWARD IRON COMPANY

WOODWARD, ALABAMA

General Sales Offices

1515 First National Building · Birmingham, Alabama · Phone 4-6786

(*Continued from page* 114)

Technology, was associated with Western Oxygen Co., Sacramento, Calif., when it was acquired by Air Reduction in 1929. He subsequently worked in the New York, Philadelphia and St. Louis offices of the company, and has been manager of the dealer sales department in New York since 1944. Mr. Yates, who joined the company in 1934, has been manager of the former arc welding sales department since 1944. Mr. Carroll joined the organization in 1917 and has been assistant to the apparatus sales manager since 1931.

♦ ♦ ♦

Appointments within the organization of three of its foundries located in Ohio, have been announced by Norris Industries, Columbus, O. **Carl Klaffke,** who has been assistant general manager of Ohio foundries since 1946, has been made general manager of the Furnace Foundry Co., Jackson, and the Foster Stove Repair Co., Ironton. Prior to joining the Norris organization, Mr. Klaffke was associated with Central Specialties Co., Ypsilanti, Mich., and American Radiator & Standard Sanitary Mfg. Co., Pittsburgh. **D. A. Evans,** local manager of the Furnace Foundry Co., joined that company when it was organized in 1944, following 18 years with Crown Pipe & Foundry Co., Jackson. **Walter Hooper** has been named superintendent, Furnace Foundry Co. Mr. Hooper has been on the foundry management staff of Norris Industries since 1946. Prior to that he was associated with Alloys Casting Co., Champaign, Ill. **John Mannigan** became superintendent of Foster Stove Repair Co. last year. He was previously with Ryther & Pringle, Carthage, N. Y., and Precision Mfg. Co., Watertown, N. Y. **Marshal B. Dewey** has been appointed general manager of the Miller Foundry Co., Columbus. Previous connections include Cuyahoga Cordage Mfg. Co., Auburn, N. Y., and Syracuse Foundry Co., Syracuse, N. Y., **William Davis,** until recently assigned to special work on the foundry staff of Norris Industries, has been made superintendent of the Miller Foundry

M. B. DEWEY WILLIAM DAVIS

Co. He joined the organization last year following 10 years with Central Specialty Division, Ypsilanti, Mich.

♦ ♦ ♦

R. E. Cairns has been appointed general manager of the Waukesha Foundry Co., Waukesha, Wis., succeeding the late **Roland F. Smith.** Mr. Cairns, who has been associated with the company for 12 years, has been assistant general manager for the last 7 years and treasurer since 1945. **E. M. Howe** will continue as sales manager of the pump division and will assume responsibility for some of the sales promotional work previously handled by Mr. Smith.

♦ ♦ ♦

Hiram Brown, formerly resident chief metallurgist of the Des Moines, Iowa, plant of Solar Aircraft Co., San Diego, Calif., has been appointed chief metallurgist of the company, with supervision over the San Diego and Des Moines plants. Mr. Brown joined the company in 1946, as chief nonferrous metallurgist in the Solar Precision Casting Division, at Des Moines, and later that year became chief metallurgist of the Des Moines plant. Previous connections include Aluminum Industries Inc., Cincinnati, Aluminum Co. of America, Cleveland and Detroit, and Frontier Bronze Corp., Niagara Falls, N. Y.

♦ ♦ ♦

Herbert H. Fairfield, formerly metallurgist on the technical staff of H. W. Dietert Co., Detroit, now is associated with William Kennedy & Sons Ltd., Owen Sound, Ontario. Mr. Fairfield was graduated from General Motors Institute in 1937. For the following 3 years he was in charge of chemicals, metallographs and sand testing in a mechanized gray iron and malleable foundry established by General Motors of Canada. From 1940-1946 he was a metallurgical engineer with the Physical Metallurgy Research Laboratories of Canada.

♦ ♦ ♦

Jack Crawford, who has been associated with the foundry supply industry for many years, has joined Independent Foundry Supply Co., Los Angeles. Mr. Crawford will be in charge of sales, equipment and engineering service. He was connected at one time with the Snyder Engineering Co., Los Angeles.

♦ ♦ ♦

C. C. Wiley has been appointed district sales manager of the Baltimore office of Link-Belt Co., Chicago, succeeding **H. Merrill Bowman,** recently appointed assistant divisional sales manager for power transmission at Chicago. Mr. Wiley joined the company in 1926, as secretary to the chief engineer at the Philadelphia plant. He has been district sales manager at Birmingham since 1946. **James T. Bell Jr.** succeeds Mr. Wiley in that capacity at Birmingham. Mr. Bell was graduated from Georgia School of Technology in 1942, and served for 3 years over-

(*Continued on page* 120)

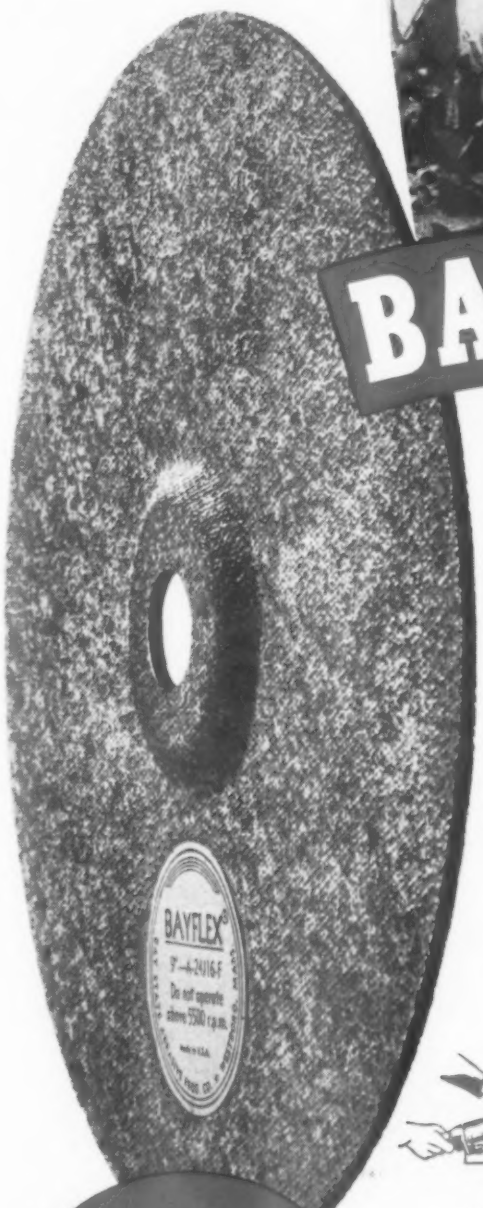
CARL KLAFFKE

D. A. EVANS

JOHN MANNIGAN

WALTER HOOPER

Christopher Columbus landing in the New World October 12, 1492.



BAYFLEX® is worth discovering too!

Columbus' discovery proved to be one of the most valuable discoveries in history . . . and *Bayflex Raised Hub Disc Wheels* have proved to be a remarkable "find" too, by foundries, welding shops, metal fabricating shops, automobile and truck body repair shops, for removing unwanted metal *faster — easier — cleaner*. Operators are pleasingly surprised with production possibilities and their increased piece-work earnings.

Bayflex discs 1/8" and thicker are made of multi-layers of cotton fiber loaded with sharp abrasive grit — flexible yet extremely strong — can be used for edge as well as surface cutting giving "40 to 1" life, and more, over conventional discs.

Words cannot fully describe this new wheel, you must see it in operation. Send coupon today for a demonstration.

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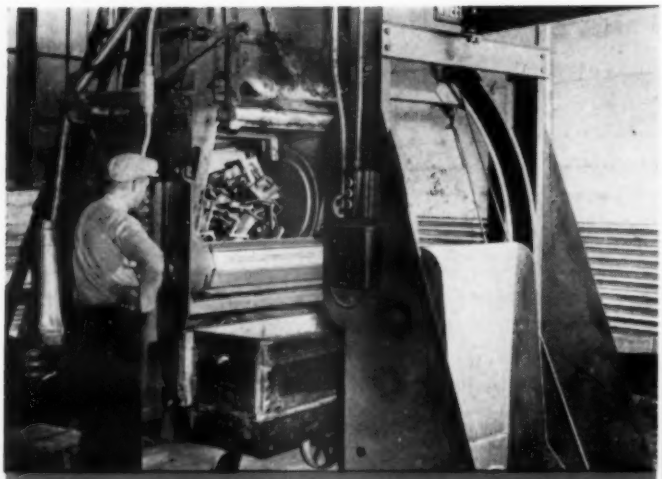
Please have your representative call just as soon as possible to demonstrate **Bayflex** Raised Hub Disc Wheels. It is understood that this will not obligate us in any way.

Company.....

Street.....

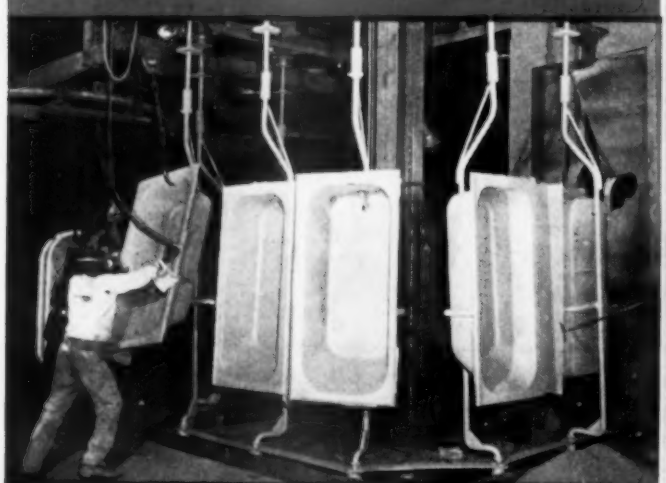
City..... State.....

Individual.....



This Wheelabrator Tumblast installed at the Guelph Stove Co., Guelph, Ontario, cleans 400 pound loads of stove parts in 5 minutes. Castings are cleaned in the green stage and again prior to enameling.

150 gas range grids are Wheelabrated hourly on this No. 2 Multi-Table at the American Stove Co., Cleveland, Ohio. Every surface of the casting has the proper finish to anchor the porcelain enamel to the metal.

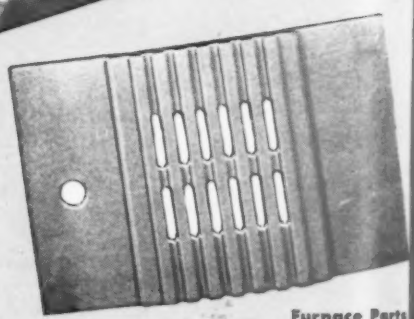


A prominent manufacturer of Sanitary ware uses this Wheelabrator Monorail Cabinet for cleaning sanitary ware prior to enameling. 120 large bath tubs are Wheelabrated hourly.

AIRLESS W

APPEARANCE AND A

Sinks and Lavatories



Furnace Parts

TYPICAL USERS

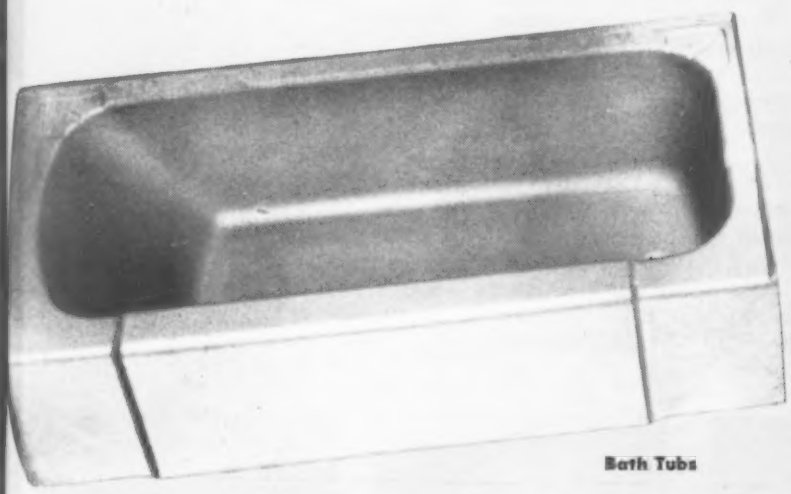
Kalamazoo Stove & Furnace Co. ..... *Kalamazoo, Mich.*
Rundle Mfg. Co. ..... *Milwaukee, Wis.*
Port Hope Sanitary Mfg. Co. ..... *Port Hope, Ont.*
The Prizer-Painter Stove Co. . *Reading, Pa.*
Tennessee Stove Works *Chattanooga, Tenn.*
Kohler Co. ..... *Kohler, Wis.*
Copper Clad Mall. Range Co. *St. Louis, Mo.*
Detroit-Michigan Stove Co. . *Detroit, Mich.*
Keeley Stove Co. ..... *Columbia, Pa.*
Samuel Stamping & Enameling ..... *Chattanooga, Tenn.*
Williamson Heater Co. .... *Cincinnati, Ohio*
Malleable Iron Range Co. *Beaver Dam, Wis.*
Mt. Vernon Furnace & Mfg. Co. ..... *Mt. Vernon, Ill.*
Peerless Foundry Co. .... *Cincinnati, Ohio*
Amer. Radiator & Std. Sanitary Co. ..... *Louisville, Ky.*
Crane Co. ..... *Chattanooga, Tenn.*
Empire Stove & Furnace Co. ..... *Owen Sound, Ont.*
General Steel Wares, Ltd. . *London, Ont.*
American Stove Co. ..... *Cleveland, Ohio*

The beauty and life of an enamel finish is only as good as the surface it covers. That is why more and more manufacturers are Wheelabrating prior to enameling. Its abrasive barrage quickly scours away all impurities, leaving a well prepared virgin metal surface to which the final finish will adhere in a permanent bond.

WHEELABRATING IMPROVES THE ADHERENCE OF ENAMEL FINISHES.

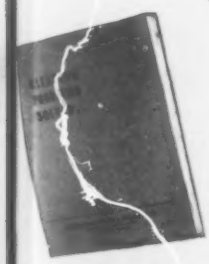
In addition to a better quality of finish at less cost, Wheelabrating gives the manufacturer a bonus in increased production, less labor and reduced power requirements. Because its fast cleaning production exceeds the output of batteries of slower machines, the Wheelabrator conserves valuable floor space. Due to the thoroughness of its cleaning, inspection is simplified, machining and grinding are faster and cutting tools last longer. For example, the installation of a Wheelabrator at the Prizer-Painter Stove Works accomplished the following:

"Since we have been cleaning stove castings on our Wheelabrator Multi-Table, the percentage of reject enamel ware has been greatly reduced. Castings are cleaned thoroughly and uniformly. The volume of production greatly surpasses the former method of sandblasting, which automatically results in a comparatively lower cleaning cost per pound. Breakage is entirely eliminated."



Bath Tubs

Stove Parts



Send for this new illustrated booklet devoted entirely to the cleaning problems of the enameling industry.

American
WHEELABRATOR & EQUIPMENT CORP.
(FORMERLY AMERICAN FOUNDRY EQUIPMENT CO.)
505 S. Byrkit St., Mishawaka 2, Indiana

(*Continued from page* 116)

seas with Army Engineers. He joined Link-Belt in 1946, at the Atlanta plant.

♦ ♦ ♦

Thomas S. Nichols has been elected president and chief executive officer, Mathieson Chemical Corp., (formerly Mathieson Alkali Works) New York. **George W. Dolan,** former president, has been elected chairman of the board of directors, succeeding A. U. Fox, who has resigned. **John C. Leppart** has been elected vice president. Mr. Nichols was formerly vice president and a director of Prior Chemical Co., New York, which he joined in 1937. He has served on various government committees dealing with chemicals. Mr. Leppart has also been associated with Prior Chemical Co., which he joined last year as vice president. Prior to that he had been assistant to the operating vice president of Southern Alkali Co. in Texas.

♦ ♦ ♦

H. S. Schweinsberg has been appointed sales manager of the Philadelphia district, Harbison-Walker Refractories Co., Pittsburgh, succeeding **C. Howard Nold,** who has retired. Mr. Schweinsberg, associated with the company for more than 20 years, was formerly assistant district sales manager at Philadelphia. Mr. Nold joined the Pittsburgh general office 45 years ago. He served in various capacities including sales and operating, until World War I, when he was in charge of the export department, and has been sales manager of the Philadelphia district since 1919.

♦ ♦ ♦

Lawrence J. Kauffman, formerly scrap purchasing agent at the Pittsburgh plant of Federated Metals Division, American Smelting & Refining Co., New York, has been appointed assistant manager of operations at Houston, Tex., under **John J. Harutan,** manager. Mr. Kauffman has been associated with the company since 1939. **Nathan J. Muskin** succeeds him at the Pittsburgh plant.

♦ ♦ ♦

A. King McCord, former vice president in charge of operations, has been elected first vice president of Oliver Corp., Chicago. **O. E. Eggen,** director of engineering, has also been elected vice president. **R. E. Melvin,** who has been general works manager, has been named vice president in charge of manufacturing at the company's Charles City, Iowa, Battle Creek, Mich., and Cleveland plants. **C. L. Hecker,** general manager of the South Bend, Ind., plant, has been made vice president in charge of manufacturing at the South Bend, Shelbyville, Ill., and Springfield, O., plants.

♦ ♦ ♦

Charles F. Hanks Jr. has joined the research department of Harbison-Walker Refractories Co., Pittsburgh. Mr. Hanks was graduated from University of Illinois in 1940 and served as a captain in the Army Infantry in the Pacific area, during the recent war. He was formerly associated with the Westinghouse Electric Corp., in the research laboratory at East Pittsburgh, Pa., and Emeryville, Calif.

♦ ♦ ♦

Webster B. Todd, formerly chairman of the board of Todd & Brown Inc., New York, has been appointed to the executive committee of American Wheelabrator & Equipment Corp., Mishawaka, Ind. Mr. Todd is also a member of its board of directors.

♦ ♦ ♦

Neil F. Ritchey has been appointed an engineer in the Technical Service Department, Reynolds Metals Co., Louisville. Mr. Ritchey was graduated from Indiana Technical College with a degree in chemical engineering and during the recent war served in the Navy, being separated with the rank of ensign. For the last few years he has been a metallurgical engineer in charge of nonferrous metallurgy in the works laboratory of General Electric Co., in Fort Wayne, Ind., and also a member of the inter-works metallurgical and standards committees.

♦ ♦ ♦

Samuel H. Gifford has been appointed sales representative of Wayne Crane Division, American Steel Dredge Co. Inc., Fort Wayne, Ind. Mr. Gifford, who attended New York University, has been active in sales and promotional work for several years. Following a training period at the Wayne Crane plant, he will be assigned to some of the company's western territories.

♦ ♦ ♦

Sara E. Southall, assistant personnel manager, International Harvester Co., Chicago, and nationally known industrial relations authority, retired Apr. 30 after 28 years of service. She joined the Harvester staff to develop policies on employment of women.

♦ ♦ ♦

Luther D. Blickenstaff has resigned as pattern shop superintendent, Flint & Walling Mfg. Co. Inc., Kendallville, Ind. Mr. Blickenstaff now is associated with Wearever Aluminum Co., with headquarters in Toledo, O.

♦ ♦ ♦

Robert Kattus has resigned as metallurgist, Aluminum Industries Inc., Cincinnati, and has been appointed metallurgist, Anderson Brass Works Inc., Birmingham.

♦ ♦ ♦

Gen. Donald Armstrong, recently executive vice president, United States Pipe & Foundry Co., East Burlington, N. J., has been elected

(*Continued on page* 122)

THOMAS S. NICHOLS

GEORGE W. DOLAN

JOHN C. LEPPART

H. S. SCHWEINSBERG

EDCO
UNIFORMITY
OF
CONTROL
High quality and correct composition are first considerations in purchasing alloy ingot. Continued uniformity of composition and quality is equally vital in the successful use of alloys in production of castings.
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EASTERN DIVISION 30 Rockefeller Plaza, New York 20, N. Y. • WESTERN DIVISION 831 S. Flower St., Los Angeles 14, Calif.

(*Continued from page* 120)

president, succeeding **N. F. S. Russell,** who has been elected chairman of the board of directors and who has served as president for 25 years. Prior to joining the company in 1947, Gen. Armstrong was assistant chairman of the executive committee of the American Standards Association. He served in the U. S. Army for 37 years, and during World War II was chief of the Chicago Ordnance District and later, commandant, Industrial College of the Armed Forces.

♦ ♦ ♦

Ralph J. Zemanek has been appointed general sales manager of the United States Graphite Co., division of the Wickes Corp., Saginaw, Mich. **Raymond H. Amberger** has been appointed sales engineer and metallurgist for Mexican graphite products and will work directly under Mr. Zemanek. Messrs. Zemanek and Amberger were graduated from Michigan College of Mining and Technology in 1935, with degrees in engineering.

♦ ♦ ♦

John B. Morrow Jr. has been appointed personnel manager for the Southern Wheel Division of American Brake Shoe Co., New York. A native of Atlanta, Mr. Morrow has been associated with the company for 28 years, and was formerly superintendent of the Southern Wheel Division's plant in Portsmouth, Va. In his new position he will be in charge of labor relations and safety activities for the division.

♦ ♦ ♦

James L. Mahon has retired as district manager of the Detroit plant of American Car & Foundry Co., New York. Mr. Mahon joined the company in 1898 as a car clerk and later held the positions of superintendent clerk, storekeeper and special traveling representative. In 1912 he was appointed superintendent of the Detroit plant and became its district manager in 1942. He has been active in the work of the foundry industry at Detroit and served as president of the Detroit Foundrymen's Association in 1930. In addition to civic, public and fraternal activities, Mr. Mahon was an enthusiastic supporter and past president of the Old Newsboys Goodfellow Fund. He held important positions on the Board of Fire Commissioners, Board of County Supervisors and the Industrial Safety Council.

♦ ♦ ♦

Charles B. Miller has been appointed Chicago district sales manager of the Mechanical Goods Division Goodyear Tire & Rubber Co., Akron, succeeding **Guy E. McMahon,** who will remain in Chicago as special represenative for the company's industrial rubber products. Mr. Miller, who has been associated with the company since 1937, has been Akron area field representative for the Mechanical Goods Division since 1945. **William F. Burdick,** who joined the company in 1937, succeeds Mr. Miller in Akron.

♦ ♦ ♦

John C. Barnes has been elected president of National Radiator Co., Johnstown, Pa. Mr. Barnes has been associated with the company since 1940, and has served as sales manager of the Washington and Philadelphia offices.

♦ ♦ ♦

Vernon Woodside has been appointed district sales manager of a new southern area office recently established at New Orleans, by Mathieson Chemical Corp., New York. Mr. Woodside was graduated from New York College of Forestry and joined the Mathieson organization in 1936, as a member of the Sales Development and Technical Service Department. Until his recent appointment he specialized in technical service to the pulp and paper industry. **Roland F. Boehm** has succeeded the late W. S. Hammond as district sales manager of the Houston, Tex., sales district. Mr. Boehm has been associated with the company since 1946. During the recent war he was assistant chief of the nitrogen unit, Chemical Division, War Production Board, Washington.

♦ ♦ ♦

E. W. Bernitt has been appointed works manager of the Kenosha, Wis., plant, Nash Motors Division, Nash-Kelvinator Corp., to succeed the late Harold E. Long. **P. G. Little,** who has has been temporary works manager, will be assistant manager.

♦ ♦ ♦

Joseph P. Wright, formerly treasurer, Western Foundry Co., Chicago, has been elected vice president in charge of sales. **Frank D. O'Neil,** formerly assistant to the president, succeeds Mr. Wright as treasurer of the company.

♦ ♦ ♦

Henry Timbrook, foundry superintendent, Reliance Foundry Co., Richmond, Ind., has acquired an interest in the East Columbus Brass & Aluminum Co., Columbus, Ind., which he will assist in managing.

♦ ♦ ♦

Price D. Garland, formerly arch and wall engineer in the Indianapolis office of Laclede-Christy Clay Products Co., St. Louis, has been transferred to Pittsburgh.

♦ ♦ ♦

Creed W. Fulton is now associated with the Samuel J. Creswell Iron Works, Philadelphia, as vice president. A graduate of Cornell University, Mr. Fulton was associated with Goulds Pumps Inc., Seneca Falls, N.

(*Concluded on page* 124)

RALPH J. ZEMANEK

RAYMOND H. AMBERGER

JOHN B. MORROW JR.

JAMES L. MAHON

A cyclone and a Sly Dust Filter collect dust from grinding and sandblast operations on non-ferrous castings. The Sly Dust Filter is needed to collect completely all the fine dust which the cyclone could not catch.

SLY DUST Control

Gets ALL the Dust —EVEN THE VERY FINE DUST

it is the FINE DUST which does the damage . . .

The *fine dust* works its way into the bearings and other moving parts of machinery and settles widely over plant and neighborhood.

Only the *fine dust* is injurious to the human body. The coarser particles are stopped by the nose and mouth; only the very fine particles enter the respiratory system.

A combination of a Sly Dust Filter and a cyclone Collector is not uncommon. Often the cyclone does not collect the fine dust. Then a Sly Filter is added to get it all.

Sly Dust Collectors are not expensive —in first cost, maintenance, operation. Ask for Bulletin 98 and tell us your problem so that we can write you fully.

THE W. W. SLY MANUFACTURING CO.

4753 TRAIN AVENUE • CLEVELAND 2, OHIO

Representatives in New York • Chicago • Philadelphia • Detroit • St. Louis
Toronto • Minneapolis • Cincinnati • Rochester • Los Angeles • Birmingham

(*Concluded from page 122*)

Y., for 17 years, in various capacities, including works manager. From 1927 to 1937 he was a manufacturers' agent and from 1938 to 1942 an industrial consultant. He joined American Pulley Co., Philadelphia, in 1942 as industrial engineer and later became director of industrial relations.

Henry Harnischfeger has been elected a vice president of the Harnischfeger Corp., Milwaukee. Mr. Harnischfeger has been a member of the board of directors of the company.

♦ ♦ ♦

Frank D. Lindquist has been appointed general superintendent, Crompton & Knowles Loom Works, Worcester, Mass. Mr. Lindquist has been associated with the company since 1919.

♦ ♦ ♦

L. Edward Roby, Jr. has been named vice president and secretary of the Peoria Malleable Castings Co., Peoria, Ill.

AFA Apprentice Contest Winners

Announced at Convention

CLEVELAND apprentices took major honors in the 1948 apprentice contest of the American Foundrymen's Association, accounting for 4 of the 12 prizes awarded in four different classifications during the recent Philadelphia convention. However, since first place in both patternmaking and gray iron molding went to apprentices of Caterpillar Tractor Co., Peoria, Ill.—compared with one second and three third place awards for the Cleveland group—the respective ranking of the two cities is open to debate.

A total of 60 items were submitted in the national contest this year, including 29 patterns, 13 gray iron castings, 9 steel castings and 9 nonferrous castings. These items previously had been judged and selected for the competition by local judges in the various AFA chapter localities.

The patterns and castings were viewed and appraised by a committee in Philadelphia, Apr. 3. Patterns were examined at the Fletcher Works Inc. by Joseph R. Hager Sr., assistant superintendent of foundries and pattern shop, Baldwin Locomotive Works, Eddystone, Pa.; Charles W. Mooney Jr., superintendent, Olney Foundry Division, Link-Belt Co., Philadelphia; Henry L. Rosse, co-ordinator, vocational education, Eddystone Burrough Schools, Eddystone, Pa.

Gray iron, steel and nonferrous castings were judged by E. A. Zeeb, assistant foundry foreman, Dodge Steel Co., Philadelphia; C. L. Lane, metallurgist, Florence Pipe Foundry & Machine Co., Florence, N. J.; C. W. Morisette, department of industrial engineering, School of Engineering, Pennsylvania State College, State College, Pa.; Edward Saks, instructor, Murrell Dobbins Vocational School, Philadelphia.

In the patternmaking contest first place was awarded Dwight French, 94 points, Caterpillar Tractor Co., Peoria, Ill. Second place, 92 points, was given James J. Kennedy Jr., Burns & Wohlgemuth, Philadelphia. Third place, 84 points, went to Carl Eppich, Standard Pattern Works, Cleveland.

First place in gray iron molding was awarded Dean Morehead, 97.5 points, Caterpillar Tractor Co., Peoria, Ill. Second place, 90.25 points, was given John Coreno, Hill-Acme Foundry, Cleveland. Third place was awarded John Valichnac, 90 points, Fulton Foundry & Machine Co., Cleveland.

Adolph Scanzoni, Continental Foundry & Machine Co., East Chicago, Ind., with 85 points was awarded first place in the steel casting division. Second place was given Vernon Delkoski 83.5 points, American Hoist & Derrick Co., St. Paul. Third place, 79 points, was awarded Frank Alabaise, West Steel Castings Co., Cleveland.

Thomas Craven, Howard Foundry, Chicago, with 96.75 points, won first place in the nonferrous molding contest. Second place, 92.5 points, was awarded Frank Posanski, Allis-Chalmers Mfg. Co., Milwaukee. Third place, 91.75 points, was won by John Wegner, Waukesha Foundry, Waukesha, Wis.

Formal announcement and distribution of prizes was an interesting feature on the Wednesday, business meeting program.

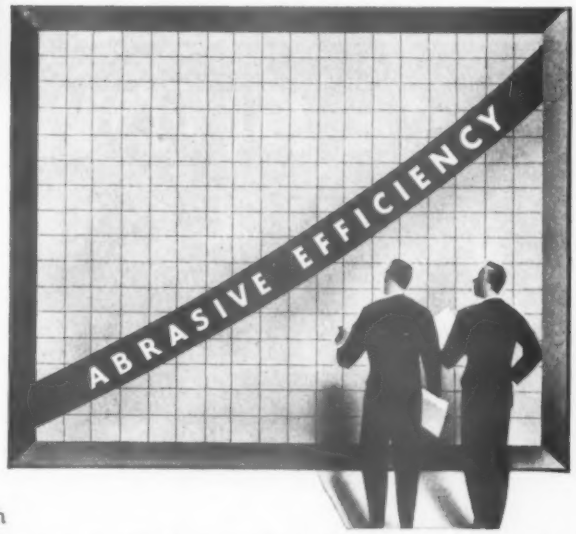
Interested groups at the Philadelphia Foundry Show inspected the display of patterns and castings entered in the 1948 AFA apprentice contest

Forms New Company

Furnace Reconstruction Co., 1630 Falls Street, Cleveland, has been formed to specialize in brickwork and furnace construction on open-hearth, reheating, cupola and blast furnaces. A. D. Smith is treasurer and general manager. Mr. Smith retired last fall from the Bethlehem Steel Co. after serving since 1922 as foundry advisor to the company in the Cleveland territory.

A BUYING GUIDE FOR ABRASIVES

ABRASIVE PROBLEM:
How does Grinding and Sanding Efficiency continue to improve?



ANSWER BY

CARBORUNDUM
TRADE MARK

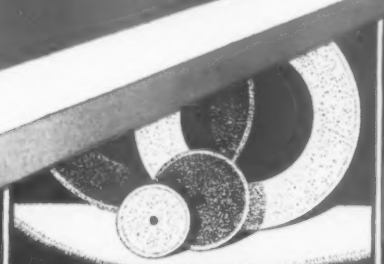
Through a continuing program of research, The Carborundum Company is constantly developing uniform abrasive products. Products that cut faster and cooler, last longer, improve finish and in other ways add to grinding and sanding efficiency.

Accomplishments of this program are well known. To the users of abrasive products they are assurance that abrasives by CARBORUNDUM are in the forefront of technical progress. It is for this reason so many manufacturers, noted for production efficiency, prefer abrasives by CARBORUNDUM. The Carborundum Company, Niagara Falls, New York.

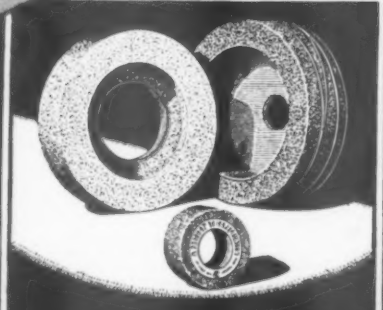
A Good Rule for Good Grinding...CALL IN

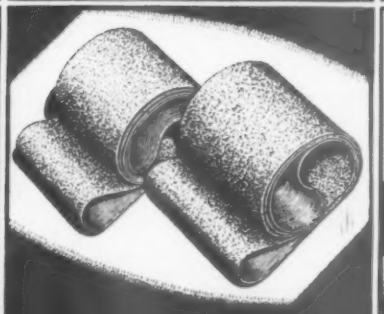
CARBORUNDUM
TRADE MARK

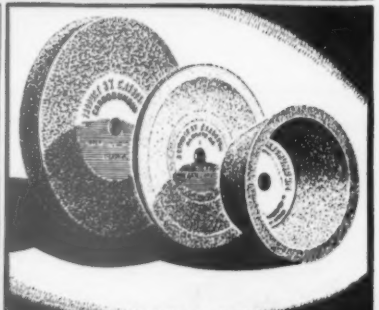
- BONDED ABRASIVES
- COATED ABRASIVES
- ABRASIVE GRAINS AND FINISHING COMPOUNDS


Specialized wheels by CARBORUNDUM for thread grinding

Diamond wheels to meet stiffer technical needs.


Cool-cutting GREEN GRIT wheels for cemented carbide


A coated abrasive for every sanding and finishing condition


All standard shapes are supplied in grinding wheels by CARBORUNDUM

"Carborundum" is a registered trademark which indicates manufacture by The Carborundum Company.

The big show

THE SHOWING OF BETTER C
... IN FOUNDRIES THAT U
TO CLEANSE THEIR METAL

EXCLUSIVE SCORED BRICK form

Famous Cornell Iron Cupola Flux

BRINGS YOU THESE RESULTS:

The many enthusiastic reports from customers who visited the foundry show, convinces us that we have really been too conservative in our claims for Famous Cornell Fluxes. *The results have been amazing.*

Following are six ways foundries profit by using Famous Cornell Cupola Flux:

(1)—Its purging action causes rapid elimination of slag and other impurities from molten metal.

(2)—It makes iron hotter and more fluid.

(3)—It aids greatly in reducing sulphur.

(4)—It enables you to pour castings that are denser grainer, stronger, cleaner—chilled sides, hollow centers, etc. are greatly reduced.

(5)—It makes machining definitely easier and smoother.

(6)—It keeps cupolas cleaner, insures cleaner drops, reduces erosion, cuts maintenance time and labor.

Write for Bulletin 46-B

Mfrs. of IRON, SEMI-STEEL, MALLEABLE, BRASS, BRONZE, ALUMINUM, and LADLE FLUXES -- Since 1918

The CLEVELAND F
1026-1036 MAIN AVE. N.

...is over, but...

R CASTINGS IS CONTINUOUS T USE L

Famous CORNELL FLUXES

Famous Cornell Brass Flux

BRINGS YOU THESE RESULTS:

CLEANSES MOLTEN BRASS, even when dirtiest turnings are used.

Clean brass insures tougher, sounder, denser grained castings, which is vitally essential in the manufacture of any casting that must stand the pressure test and take an extra fine finish.

Several elements in this flux combine to gather the gases, while the metal is being melted, and cause them to form into balloon shaped bubbles and rise to the top of metal. The slag is very essential as a cover to retain heat during melting process.

Less tin and other metals are required. Crucible and furnace linings are preserved.

Write for Bulletin 46-A

Famous Cornell Aluminum Flux

BRINGS YOU THESE RESULTS:

PURIFIES MOLTEN ALUMINUM. Plays an important role in the production of sound, tough castings.

It enables you to use more scrap without danger of dirt, porous places or spongy spots in castings.

You can pour stronger yet thinner sections.

NO FUMES! No obnoxious gases to bother workmen, due to our exclusive formula.

Metal does not cling to dross.

Write for Bulletin 46-A

D FLUX Company

VE., N.W., CLEVELAND 13, OHIO

FAMOUS CORNELL FLUXES
Trade Mark Registered

INDUSTRY Briefs

ELECTRIC Steel Foundry of Portland, Oreg., manufacturer of dragline buckets, power shovel dippers for general purpose and coal stripping and loading, is expanding plant facilities at its Danville, Ill., branch plant which was built recently. Floor area of the shop will be increased 125 per cent and a new office building is to be included in the expansion program.

* * *

Buffalo Pipe & Foundry Corp., Buffalo, has acquired the assets of the American Sigma Corp., Buffalo, which it will operate as a Nonferrous Division, specializing in the production of aluminum, brass and bronze castings by the permanent mold process. In addition, the company has expanded and enlarged its facilities for the production of nonferrous sand castings.

* * *

Lindberg Engineering Co., 2444 West Hubbard St., Chicago, manufacturer of industrial heat treating and melting furnaces, has acquired the assets of the Electronics Division, Illinois Tool Works, Chicago, and will continue the manufacture and sale of high frequency induction and dielectric heating equipment. Operations are being moved into the Lindberg plant. Company plans construction of a new building adjoining the present Lindberg plant, completing an expansion program started several years ago.

* * *

Columbiana Pump Co., West Railroad St., Columbiana, O., is constructing two foundry additions which will add over 8500 sq ft of floor space. Additions will be used for increased space in the cleaning and core departments and in the pattern storage department. Locker and shower rooms also will be installed.

* * *

Eastern Foundry Supplies Inc., 500 Chancellor Ave., Irvington 11, N. J., has been formed to take over the sales functions of Refractory Mica Products Inc., New Jersey, in the eastern district. W. C. Russell is president and F. H. Davis is vice president and treasurer.

* * *

Hays Corp., Michigan City, Ind., dedicated a new manufacturing building at ceremonies Mar. 18. New plant will be devoted exclusively to the fabrication of panel boards for automatic combustion control and instruments and controllers used in process plants.

* * *

The business of Chas. Monk, manufacturer of molders' tools, located at 83 Eighteenth St., Brooklyn, N. Y., has been purchased by A. T. Richardson, Paul F. Rice and A. T. Richardson Jr. The new firm is operating under the name of the Monk Tool Co. at the old address.

* * *

Tabor Mfg. Co., Philadelphia, has appointed Snow & Galgiani, 533 Second St., San Francisco 7, as its representatives in California north of Fresno. Natale F. Galgiani, Charles E. Pretzinger and William F. Quirie of Snow & Galgiani will all represent Tabor.

* * *

Indiana Die Castings Inc., 2500 South J St., Elwood, Ind., newly formed company, has started production of zinc and aluminum die castings. R. W. Johnson is company president; C. C. Wilkerson is general manager, and Orville Parrish, assistant manager.

* * *

Thompson Brothers Pattern Works, Indianapolis, has moved from 1542 West Washington St., to larger quarters at 1125 Cruft St. The new building provides over 13,000 sq ft of floor space, more than doubling in size the former facilities.

* * *

Ingot Brass & Bronze Industry, 308 West Washington St., Chicago 6, reports that combined shipments of ingot brass and bronze for March, 1948, were 24,282 tons, compared with 22,487 tons in February, 1948, and 27,477 tons in March, 1947.

* * *

Chemalloy Foundry Co., Louisiana, Mo., has started partial production in its new building constructed on land donated by the Louisiana Chamber of Commerce. Company's original foundry was destroyed by fire Oct. 20.

* * *

Chicago district sales office, Whiting Corp., has been moved to First National Bank Bldg., 33 South Clark St., Chicago 3. New address of the Pittsburgh office is Empire Bldg., 505 Liberty Ave., Pittsburgh 22.

* * *

Linde Air Products Co. unit of Union Carbide & Carbon Corp., 30 East 42nd St., New York 17, plans construction of an oxygen filling station and acetylene-producing plant at Billings, Mont.

* * *

Swayne, Robinson & Co., Richmond, Ind., has leased the plant formerly occupied by Mal-Gra Castings Co. in Cambridge City, Ind., for the production of gray iron castings.

* * *

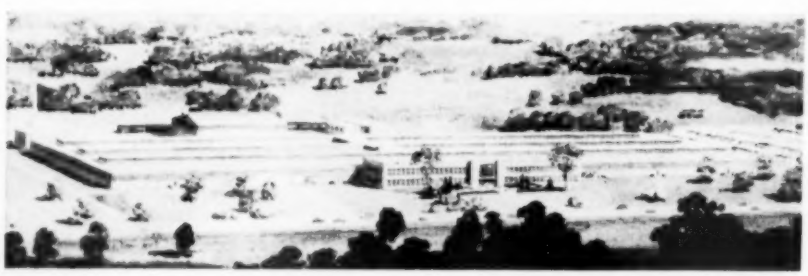
Ross Aluminum Foundry Inc., 1738-1/2 East 43rd St., Los Angeles, recently was formed by Howard Weston and Earl W. Ross.

* * *

Nixon Foundry, recently opened near Valparaiso, Ind., is engaged in the production of brass, bronze and aluminum job castings.

* * *

E. A. Vermere Inc., 1821 Randolph St., Los Angeles, die casting plant, suffered $250,000 fire loss Mar. 20.



NEW PLANT: Architect's sketch of the new plant to be built at Utica, N .Y., this spring for Chicago Pneumatic Tool Co., New York, is shown above. It will contain over a half-million sq ft of floor space and has been designed in accordance with the newest techniques in materials handling, work simplification and safety provisions.

PRECISION PATTERN

THE HALLMARK OF EVERY BUFFALO PATTERN FOR OVER 55 YEARS

● When you consider the time and materials involved in producing intricate castings... you can appreciate why leading automotive, aviation and diesel engine manufacturers bring their Precision Pattern problems to Buffalo Pattern Works.

For here is a fifty-five year old organization, whose whole experience and complete modern facilities are devoted to the making of "Precision Patterns" exclusively.

When Buffalo translates your blueprint into a Precision Pattern... you can be sure that it will meet your strictest requirements, not only for dimensional accuracy, but also for structural soundness... the combination that pays off in high production of castings... at lowest cost!

Send us your problem!
Write, wire or phone. RI. 3512.

BUFFALO PATTERN WORKS
THE PRECISION PATTERN MAKERS... SINCE 1893

830 HERTEL AVE.
BUFFALO 16, N. Y.

Randall (Bench Model) CORE BLOWER

"DESIGNED TO PRODUCE"

THE EXTRA BIG SAND HOPPER
SAVES refill time—
MORE cores per hour

• The big sand hopper on this Bench Model makes volume production easy on small cores. With one filling, the operator can blow many cores. Lessens operator fatigue and saves waste motion. Simultaneous blowing and clamping with one lever on horizontal boxes. Users of these machines save many minutes every hour and produce many more cores.

See your jobber and check the many advantages of The Randall Core Blower.

THE RANDALL FOUNDRY EQUIPMENT CORPORATION

4600 East 71st Street . . . Cleveland 5, Ohio

More cores with amazing speed

Ask your jobber for a demonstration of the popular Randall Core Blower.

Sold through leading jobbers everywhere.

THE Randall CORE BLOWER

"DESIGNED TO PRODUCE"

Announcing...

Randall TWIN FURNACE

"DESIGNED TO PRODUCE"

NEW · ECONOMICAL · MANY PRODUCTION BENEFITS

Pilot installations show that foundrymen can expect considerable operating economy with this new twin furnace.

At last, you can have a *top fired* crucible furnace which combines TWO furnaces into ONE complete production unit. Randall-Twin pays for itself.

Twin melting furnaces are interconnected. While top firing one of the twin furnaces "A," the charge in the crucible of furnace "B" is being preheated by waste heat from "A." After pouring and recharging the crucible in "A," furnace "B" is top fired thus reversing the process and the charge in furnace "A" is preheated.

With gas at 19 C. F. M. a heat is pulled from a No. 70 crucible every 20 to 25 minutes.

Each furnace has a separate cover and the furnace tender can charge each furnace in the conventional manner. Nothing new to learn.

RANDALL-TWIN FURNACES ARE PAYING FOR THEMSELVES OUT OF SAVINGS *ALONE* IN 12 TO 18 MONTHS. Write for literature and prices.

THE RANDALL FOUNDRY EQUIPMENT CORPORATION
4600 East 71st Street . . Cleveland 5, Ohio

Randall TWIN FURNACE
will save you money

HERE ARE BENEFITS YOU GET FROM Randall TWIN

1. Cuts fuel costs.
2. Waste heat from one furnace used in preheating the other.
3. Less temperature loss.
4. Uniform temperature.
5. More production.
6. Easier on furnace tender.
7. No spiralling flame.
8. Metal lies dormant.
9. Longer crucible life (50%).
10. Metal from leaking crucible can be saved.
11. 25% longer lining life.
12. No weekly patching job.
13. Less oxidation.
14. Less metal shrinkage.
15. No plugged burners.
16. Lower installation cost.
17. Shipped complete.
18. One gas and one air line connects both furnaces.
19. Foolproof controls.
20. Pays for itself in savings alone.

MAIL COUPON TODAY AND SEE WHAT YOU CAN SAVE!

COMPANY NAME_____

YOUR NAME, TITLE_____

ADDRESS_____

CITY_____ STATE_____

FOUNDRY Developments

By EDWIN BREMER

ADVOCATES of step-gating for tall castings were somewhat amazed to see that such a system did not function as generally supposed; that is, as the metal rose in the cavity to the next step or branch, feeding began at that point, etc. Actually, except where the sprue extends below the casting cavity and the branches rise sharply from the horizontal, or when the sprue as well as the branches are stepped, all the metal enters through the bottom sprue, and is sucked into the branches as the metal rises to the openings. In the case of the angular branches a considerable amount of metal enters through the bottom branch and less through the others. With sprue and branches stepped, practically all the metal flows through the top branch. All of those actions were clearly shown in a colored motion picture produced at the Naval Research Laboratory by W. H. Johnson and W. O. Baker, and shown at a steel round-table luncheon at the AFA convention in Philadelphia. Open molds were employed, metal was steel, and photography was excellent. Action of finger gates also was shown, and as in the case of step gating, the results were different than expected. In general the finger gates at opposite ends of the branch did all the feeding.

• • •

INVESTIGATING some of the hazards involved in handling commercial perchloric acid, a valuable oxidizing agent also widely used in chemical analysis, the Bureau of Mines has determined the sensitivity to detonation of mixtures of perchloric acid and more than a dozen oxidizable materials, according to Director James Boyd. Five separate methods of detonation were investigated—by heat, impact, sparks, flame and explosive impulses. Oxidizable materials mixed with perchloric acid in the tests included wood, excelsior, paper, cotton, lampblack, coal dust, high-volatile pitch, low-volatile pitch, turpentine, fuel oil, rubber, linoleum, sulphur and sugar. Report of Investigations 4169, "Investigations of Explosion Hazards of Perchloric Acid and Mixtures of Perchloric Acid and Organic Materials" by M. A. Elliott and F. W. Brown, may be obtained from the Bureau of Mines, Publications Distribution Section, 4800 Forbes St., Pittsburgh 13.

• • •

AIR ranks with ore, fuel, flux and water as an important material in iron and steel making, according to the American Iron & Steel Institute. Because it is available in inexhaustable quantities, and because there is no invoice rendered for a given number of tons at a specific price, it is commonly overlooked in a discussion of the materials of steelmaking. For example, for every ton of pig iron made in a blast furnace about 4½ tons of air are required; solid raw materials entering the furnace add up to only 3¼ tons for each ton of hot metal produced. For each ton of steel produced in an open-hearth furnace with a conventional 60 per cent hot metal and 40 per cent scrap charge, about 0.2-ton of air is required to promote chemical reactions. In a 25-ton bessemer blow 0.64-ton of air per ton of steel is required. Last but not least we might mention that 1 to 1½ tons of air are required to melt 1 ton of iron in the cupola.

• • •

LATEST and extremely interesting development in the gray iron field is the production of nodular graphite structures by the addition of cerium. Details of some of the procedures and results obtained were presented by H. Morrogh, British Cast Iron Research Association, at the recent AFA convention. Essential requirements for the process are: The iron must solidify gray even without the cerium addition. The iron must be of hypereutectic carbon content; that is, the carbon content should exceed the value 4.3 − 1/3 (% Si + % P). When the nickel content of an iron exceeds 10 per cent, it need not be hypereutectic, according to this formula. Silicon content can have any value, but is preferably within the range 2.3 to 7 per cent. Sulphur content of the metal to be treated should be as low as possible, and after treatment should be below about 0.015 per cent. Phosphorous content should not exceed about 0.6 per cent, and should be preferably below 0.1 per cent. Manganese, copper, nickel, chromium, and molybdenum may be present in any amounts, singly or in any combination, provided the condition first mentioned is observed. After treatment with cerium the solidified castings must contain more than a certain minimum amount (0.02 per cent) of the element dissolved in the metallic matrix.

• • •

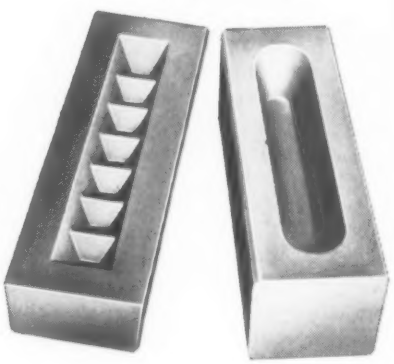
SUCCESSFUL new process for depositing a thin film of zinc on magnesium permits for the first time the electroplating of magnesium by essentially standard techniques, according to Dow Chemical Co., Midland, Mich. Initial stages in procedure are specifically to remove contamination and to provide the correct reactive surface for promoting adhesion and a continuous deposit. This is followed by deposition of an adherent thin film of zinc, and from that point on all plating is accomplished in commercially used baths for chromium, silver, gold, copper, brass, etc.

• • •

STUDY of the susceptibility of austenitic stainless steels (18 per cent Cr and 10 per cent Ni) to intergranular embrittlement or corrosion, by S. J. Rosenberg and J. H. Darr, National Bureau of Standards, indicated that substantially complete immunity may be obtained with a minimum ratio of Cb/C = 10 and Ti/C = 5. For more foolproof immunity the ratios should be 12 and 8, respectively. Stabilizing treatment at 1600°F had a negligible effect on the resistance to intergranular embrittlement of the Cb-treated steels so that those carrying a sufficiently high ratio of Cb/C may be used without that heat treatment. However, performance of Ti-treated steels carrying higher ratios of Ti/C was markedly improved by such treatment.

How to get CLEANER METAL

USE "National" over-metal and pig molds!



Over-metal and pig molds made of "National" electric furnace graphite produce cleaner ingots faster and more economically. Graphite is immune to thermal shock, insoluble, not wet by molten metal, easy to machine, has high thermal conductivity, and lasts indefinitely. This means ingots chill rapidly, won't stick in the mold, are free from contamination and smooth in finish. No mold wash necessary. Quick chill cuts floor space and number of molds to the minimum.

USE "National" fluxing tubes and pyrometer sheaths!

"National" graphite fluxing tubes, for purification of hot metals, give unusually long life and will not contaminate the metal. They are heavy-walled, easily threaded, will not fuse or dissolve, and are not attacked by Nitrogen, Chlorine, or the rare gases. Stocked in 2" OD by ½" ID by 2', 3', 4½', 6', and 9' lengths. "National" graphite thermocouple sheaths are similar in construction to the fluxing tubes, except that they are blind end. Both products possess all the advantages of pure electric furnace graphite.

USE "National" skimmer floats!

"National" graphite skimmer floats prevent oxidation, hold back slag and dross, and will not contaminate the casting metal. They are fitted with a convenient lifting hole for easy handling and may be used over and over again. Made of pure electric furnace graphite—no foreign bond—these floats will not spall or crack. Stocked in diameters from 3" to 9" for use with crucibles #5 to #100 inclusive. "National" skimmer floats pay for themselves!

The term "National" is a registered trade-mark of

NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide and Carbon Corporation

UCC

30 EAST 42nd STREET, NEW YORK 17, N. Y.

Division Sales Offices: Atlanta, Chicago, Dallas, Kansas City, New York, Pittsburgh, San Francisco

These products sold in Canada by

Canadian National Carbon Company Limited, Toronto 4, Canada

AROUND Detroit

By A. H. ALLEN
Detroit Editor
THE FOUNDRY

Ford accelerates production of new models . . . Improved hot metal carrying facilities speed up operations on cast crankshafts, which are being continued in 1949 engines

IN A COUPLE weeks the big public fanfare over the 1949 Ford passenger cars will be in full swing, and because it was planned that way, dealers will have plenty of new cars in their showrooms. A much shorter plant changeover period than had been planned, and steadily accelerating production last month, combined with a few dashes of what E. R. Breech, executive vice president, likes to call the "Breech luck," will mean about 50,000 cars off the assembly lines by June 18 or the equivalent of seven or eight per dealer.

Production foundry at the Rouge plant was one of the last departments to make the changeover, using the time while other departments were down to build up a bank of 60,000 cylinder blocks. They were stacked nine high along the entire south end of the foundry building and made an impressive sight. Two-thirds of them will be service blocks, and their production reduced the down time in the foundry from five weeks to less than three.

Operations resumed in the foundry on May 10 and, prior to reopening, over 100 men were assigned to clean-up work, doing such jobs as cleaning pits and elevator shafts, removing dirt from roof and structural steel work and generally making the plant shipshape. Cinder catches were installed on two cupolas for testing; if they prove successful they will be added to all cupola melting units. A new type of dust collector was installed on one of the electric furnaces also on a test basis.

Overhauling of the sand handling equipment also was accomplished, and over half of the sand delivery belt was moved from an aisle to an overhead position, relieving a dust condition in the main aisle. In addition, sand no longer will be brought in "bone dry," but will be blended with damp sand so that it contains about 2 per cent moisture, thereby minimizing dust developing in transit.

An enormous stockpile of foundry sand, covering an area of about 45 acres and comprising better than half a million tons, is maintained by Ford on a site near Melvindale, close to the Rouge plant. Last year, for example, the production foundry used 315,662 tons of sand, with additional smaller amounts required for the jobbing foundry and the glass plant. This year, between April and October, another 531,000 tons of sand will be brought into the pile.

Four types of sand are purchased—sharp, bank, silica and molding sands. Most of it, of course, is sharp sand brought in from the dunes along Lake Michigan, near Manistique and Grand Haven, Mich., where it is loaded directly onto boats for transfer to the Rouge docks. There it is unloaded to cars, moved to storage and then back to the foundry as needed. As might be imagined, probably 65 per cent of the cost of this sand is represented by handling and transport. Bank sand is hauled in by rail from Vassar, Mich., over 47,000 tons being mixed with sharp sand in the production foundry last year. The other types of sand are required in much smaller quantities by the foundries and by the blast furnace department.

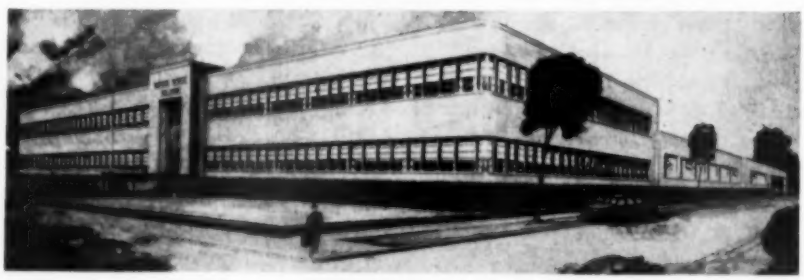
Lincoln Uses Steel Crankshaft

Ford will continue with cast crankshafts in 1949 engines, except for the new Lincoln V-8 power plant which has reverted to a forged steel shaft. Metal for the Ford shafts is melted in four 15-ton nose tilt electric arc furnaces, cold charged with accurately weighed quantities of scrap steel, pig iron, limestone and alloys. No molten metal from cupolas is added. The shaft is cast in a stack mold made up of 16 sections, it will be recalled. Recent adoption of a chill plate at the base of the mold has eliminated the need for internal chills and has resulted in an improved casting metallurgically. It is cast free from primary graphite and is subsequently annealed to produce secondary graphite in a pearlitic matrix.

Improved hot metal carrying facilities have been installed to speed up handling of crankshaft metal from furnaces to the pouring reel. Under the new arrangement, an entire heat will be taken from a furnace in two ladles, replacing the 1600-pound ladles formerly used. Holding time in the electrics will be eliminated since entire heat can be accommodated in the two large ladles. A saving of 40 minutes, or 25 per cent of the heat cycle, will be realized by the new system, as well as fewer furnace repairs.

Installation of new molding machines and other equipment on a tractor housing job at the Ford production foundry has resulted in an increase of 30 per cent in production per shift. On a recent run, 2039 castings were poured over two shifts, 600 more than the former record.

Opens New Administration Building



INDEPENDENT Pneumatic Tool Co. has opened a new administration building adjacent to its main works at Aurora, Ill. The building provides office space involving an area of 40,000 sq ft on two floors and additional space for machine shop, factory and steel storage of 35,000 sq ft.

Completely modern in design, construction and furnishings throughout, the building is equipped for air conditioning, radiant heating and latest type lighting. The exterior is of sand colored brick and limestone.

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There is one thing that can always be said about conveying equipment that goes into heavy industry—it gets an awful beating. And, it's got to be tough to stay on the job. Plant operating men, responsible for keeping costs down, know that very well—and so do conveyer people who have had years of experience in designing conveying equipment that will work under severe service.

Mathews Engineers like heavy jobs, probably because they've handled so many of them. They've put gravity and power conveyers and special conveying machinery in just about every place it can be used to advantage in foundries, steel plants and brass mills.

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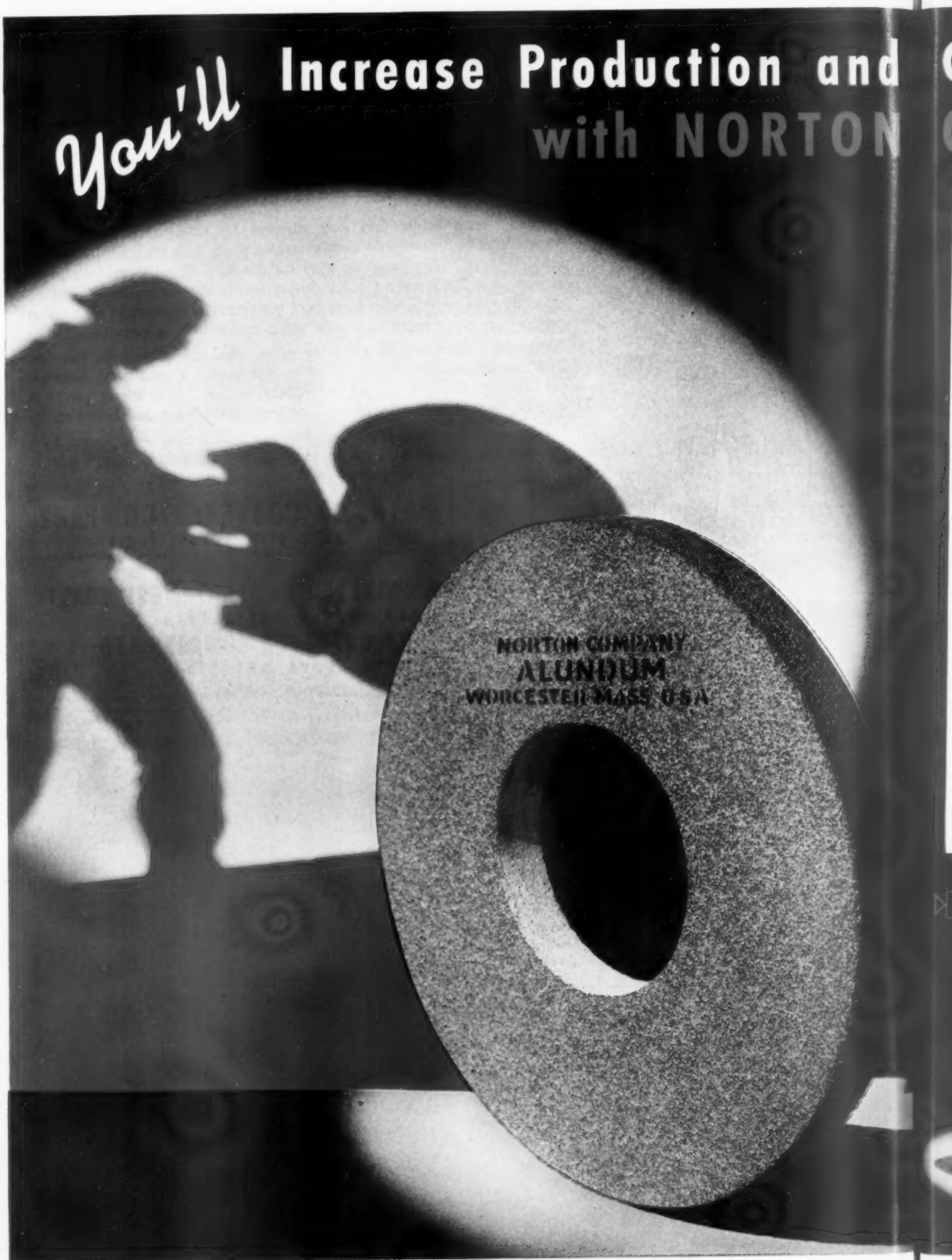
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AFA CONVENTION

(*Continued from page* 73)

provide good working conditions, and that every foundry can modernize in one way or another with a resultant reduction in cost and improvement in products. Foundry modernization, he pointed out, must be tailored to fit the particular plant under consideration.

Some items, he said, which should be investigated to secure maximum results are: Sales methods and prices; organization and personnel; cost control; patterns, rigging, production equipment and methods; wage incentives; plant layout, material handling, good housekeeping; and mechanized or motorized facilities.

Mr. Knight pointed out that modernization and mechanization are not synonymous because many types and sizes of foundries cannot effectively use or economically justify mechanization.

In any general program of modernization personnel is one of the first phases to consider. One of the problems today is lack of properly trained supervision, he said, adding that during the last five years the foundry has gained virtually no supervisors with adequate background; hence the need of intensive supervisory training.

Each program should be designed to fit the individual plant requirement and financial condition. Overly simplified, perhaps, the foundry problem, he said, consists first, of rigging to produce economically and, second, of adequately handling materials.

With respect to selling methods, he said the old idea of selling castings for a conversion cost of metal at so much per pound should be replaced by the sale of an engineering casting to do the job at so much per piece.

He thought that much could be done in bettering the design of the casting and construction and design of the pattern, corebox and flask equipment. Many castings are virtually "made" in the cleaning room instead of the foundry, he remarked. Consistently high scrap losses usually indicate faulty pattern and rigging of the job. He believed that wherever economically practical, patterns should be mounted on plates or boards, with gates and risers mounted or clearly indicated.

The speaker stressed good house-

(*Continued on page* 142)

Non-Ferrous Founders' Society Directors Meet

AT a meeting of the board of directors, Non-Ferrous Founders' Society, May 2, at the Drake Hotel, Philadelphia, a survey report on business conditions throughout the country showed that orders for brass and bronze castings are still falling off, with the exception of manufacturing districts in the South. It is conceded that business generally is close to the normal of 1937-1941, with the exception of the South where an industrial expansion in oil and lumber presently is continuing. Aluminum volume is holding steady with any further expansion curtailed by a shortage of both virgin and secondary materials.

Considerable concern was expressed at the instability of metal prices and at the increases demanded and awarded labor, particularly since prices are being maintained on products purchased by foundries. There was a favorable reaction throughout the country to the recent survey of "fringe issues," made by the society on labor contracts. It was decided to make this survey twice a year, the wage survey being continued quarterly.

Committees are set up to serve at call the various government agencies where the nonferrous industry is concerned. The national Cost Committee has perfected its plans for cost clinic lecture studies, based on the society's cost manual, to be offered by various chapters. Chapters are faced with many local problems but it was agreed that cost education was of prime importance in chapter activity.

Members of the board expressed their appreciation to the American Foundrymen's Association for use of a booth at the foundry show. It was decided to hold the society's annual meeting in Philadelphia, Oct. 22.

Members of the board of directors and alternates of the Non-Ferrous Founders' Society in session at Philadelphia, May 2. Sitting: Charles E. Schley, Roy N. Jacobs, Charles H. Stokesbury, H. F. Sweitzer, Louis Fischer, R. R. Cairnie, William A. Gluntz, Ruth Anne Windsor, William E. Paulson, O. W. Swangren, J. B. Langford, J. D. Zaiser, W. B. Wilkins, H. G. Wellman, G. B. Hazen, R. E. Bietry and Alex Chrystall. Standing: Chester A. Faunt, Charles Wegelin, Frank Jacobs, Robert Langsenkamp, A. M. Cadman, Walter M. Clark, William L. Leopold, Fred Haack Jr., L. H. Durdin, J. W. Wolfe and J. J. Shea.

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	Typical Composition
GRADE "A" *(Open Hearth)*	Vanadium . . . 35-40% Silicon . . . . max. 12% Carbon . . max. 3.50%
GRADE "B" *(Crucible)*	Vanadium . . . 35-45% Silicon . . . max. 3.50% Carbon . . max. 0.50%
GRADE "C" *(Primos)*	Vanadium . . . 35-45% Silicon . . . max. 1.25% Carbon . . max. 0.20%
HIGH V GRADES	Vanadium . . . 50-55% 60-65% 70-80% Silicon . . . . . Low Carbon . . . . . Low

Large stocks are carried of all grades of alloys, and they can be supplied in any of the standard lump, crushed, or mesh sizes.

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The Jar, Power Rollover, Power Draw machine will complete its cycle of operations in 35 seconds or less. And that's counting the time to deliver the mold to a hydraulic device which cushions it down to desired conveyor level.

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Both machines put high-production features into short-run work. The new plate design on the Rollover machine is a Tabor innovation. It permits *independent* setting of all four clamps—speeds changeover where pattern shifts are frequent.

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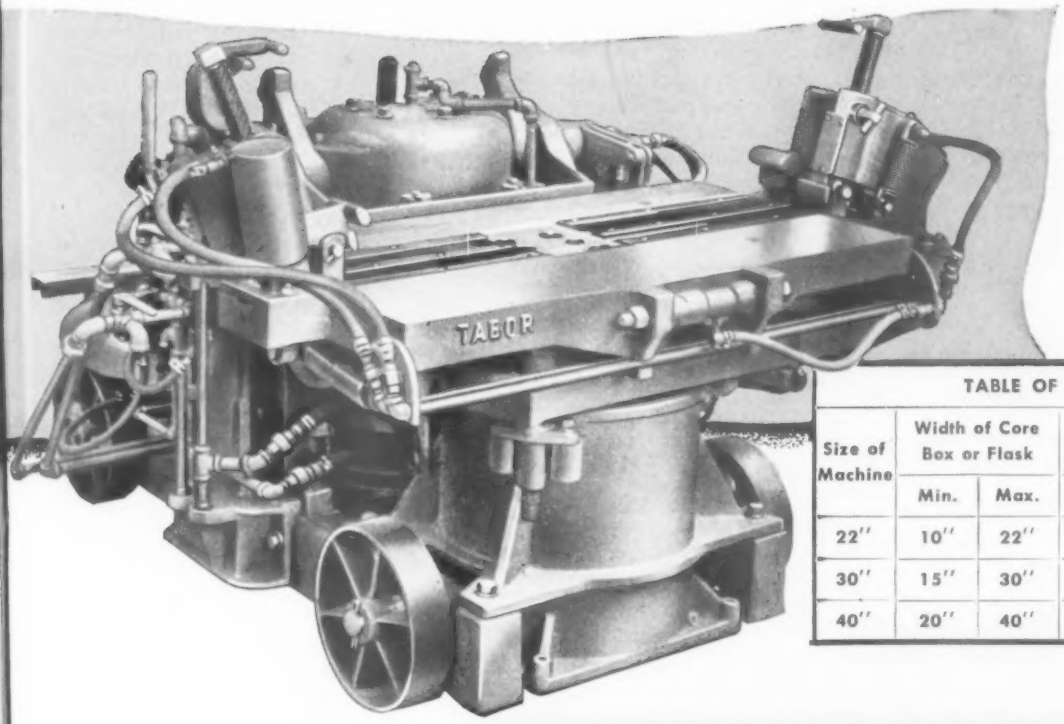
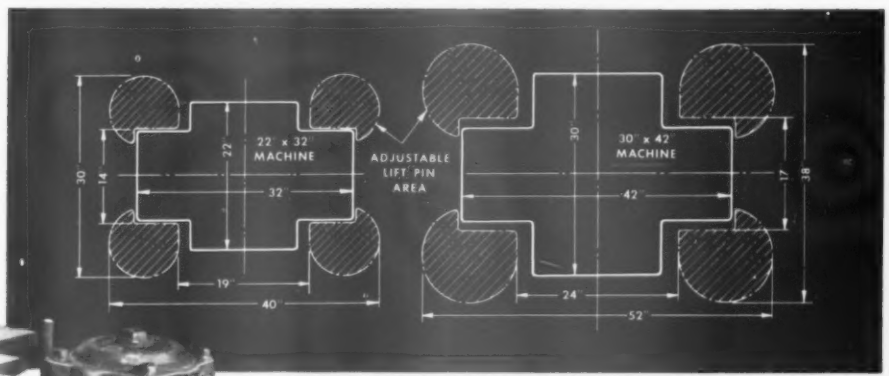
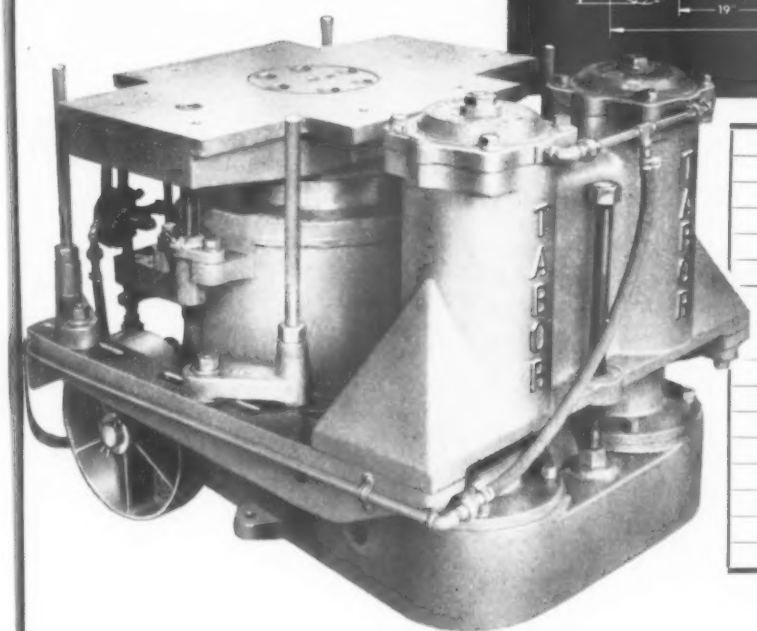


TABLE OF STANDARD SIZES						
Size of Machine	Width of Core Box or Flask		Length of Core Box or Flask		Height—including core plate	
	Min.	Max.	Min.	Max.	Min.	Max.
22″	10″	22″	20″	40″	7½″	14″
30″	15″	30″	26″	46″	8″	18″
40″	20″	40″	28″	56″	12″	25″

*Also available with squeeze head.





Size of Machine	22″ x 32″*	30″ x 42″
Table Size	22″ x 32″	30″ x 42″
Capacity—80# Air	600#	1000#
Patt. Draw.—Plain Jar	10″	12″
Patt. Draw.—Shockless	9″	12″
Lift Pin Adjustment	See cut	See cut
Max. Width Flask with Center of Flask on Center of Jar Mach.	30″	38″
Min. Width Flask	14″	17″
Max. Length of Flask	Unlimited within capacity of machine	
Patt. Draw.	Oil Controlled—Slow & Fast	
Height Table from Floor—Portable	28″	32″
" " " " —Stationary	26″	30½″
Portable Mach. 3 Wheels	12″ Dia. 3″ Face 14″ Dia. 4″ Face	
Stationary Mach.	3 Foundation Bolts	
Weight Shockless Jar	2600#	4000#
Weight Plain Jar	1900#	2700#

. . . buy *Tabor*

MANUFACTURER'S ASSOCIATION, INC. FOUNDRY EQUIPMENT

(*Continued from page* 138)
keeping as another thing that can be done to add to the efficiency of a foundry, without involving any heavy outlays. He remarked that the only really successful housekeeping programs are those where the individual workmen keep things orderly and in proper place as they go along.

Many things, he emphasized, can be done toward foundry modernization without important expenditures; important expenditures may be desirable and economical if they can be properly financed, but these other things should come first in any program. With the aid of lantern slides he described what is being accomplished in various plants through the more efficient use of existing equipment, often the result of rearrangement and alterations, and through selective buying of new equipment.

ALUMINUM AND MAGNESIUM

Discussed at Three Sessions

OPENING session on discussion of problems relating to production of aluminum and magnesium castings was held Monday morning with L. Brown, Magnesium Fabricators Division, Adrian, Mich., and A. T. Ruppe, Bendix Aviation Corp., South Bend, Ind., presiding. First paper presented was on "Effect of Gating Design on Metal Flow Conditions in the Casting of Magnesium Alloys," which was prepared by J. G. Mezoff, Saginaw Bay Industries Inc., Bay City, Mich., and H. E. Elliott, Dow Chemical Co., Bay City, Mich., and discussed by the latter.

Study of the gating of magnesium castings by the authors indicated that turbulence at that point led to defective castings through inspiration of air in the sprue, formation of skins, etc. Further investigation revealed that the turbulence and subsequent defective castings could be reduced by several methods, including a reduction in pouring rate, or use of non-aspirating sprues such as the slot gate. Even more effective was the use of a skim gate or screen with steel wool in the runner. That arrangement appeared to perform two functions of holding turbulence to a minimum and filtering out skins and oxides.

Second paper by the same authors dealt with "Gating System Designs Affect Pouring Rates," and was presented by Mr. Elliott. Investigation was performed with magnesium alloys and it was found that turbulence at the entrance mouth or top of the sprue caused a decrease of metal flow as the sprue area increased. With slot sprues the sidewall friction or resistance caused reduced flow. Use of tapered sprue rather than those of uniform cross section was found to give better pouring rate, but no quantitative work to establish the suitable taper was carried out.

Concluding discussion related to "Step Aging of Magnesium-base Casting Alloy," by E. J. Vargo, Wellman Bronze & Aluminum Co., Cleveland, and George Sachs, Case Institute of Technology, Cleveland, and was presented by Mr. Vargo. Alloy studied contained 6 per cent Al, 3 per cent Zn, and 0.2 per cent Mn, and it was found that aging test bars at two different temperatures led to either an increase in physical properties or to a decrease in length of time required to obtain a given combination of properties. Temperatures used were 250°F for the first step and 350 or 400°F for the second. Total time varied from 4 to 16 hours.

Two interesting papers were presented at the second session on aluminum and magnesium which was held Monday afternoon with C. E. Nelson, Dow Chemical Co., Midland, Mich., and M. H. Young, Wright Aeronautical Corp., Wood Ridge, N. J., presiding. First paper on "Can Castings Be Engineered?" was presented by F. G. Tatnall, Baldwin Locomotive Works, Eddystone, Pa. He described wire strain gages and the technique employed in their use for analyzing strain in castings or other metal components, and the application of brittle lacquer for the same purpose. He pointed out, however, that brittle lacquer only indicates where stresses are present and to some degree the points of greatest stress. Actual measurement of the amount must be determined by attaching wire strain gages in such locations.

Second paper dealt with "Engineering for Aluminum Alloy Castings," by T. H. Gauthier and H. J. Rowe, Aluminum Co. of America, Pittsburgh, and was presented by Mr. Gauthier. Numerous phases discussed included the characteristics of aluminum alloys, design considerations, and casting methods. Since no one alloy possesses the optimum properties or is suitable to all methods of casting, a compromise must be made and the casting producer can aid in that determination from his experience. In design it is necessary to secure directional solidification, and the designer must strive to arrange sections so that they will be fed properly. Tapered sections are valuable to that end, but since they sometimes are not practical, a uniform section can be used. Where thick and thin sections join, a gradual increase from thin to thick should be used.

From the molding and coring viewpoint, parting lines should be made as straight as possible, deep pockets and small recesses should be avoided, and coring of small holes be eliminated. Ideal design of a sand casting is such that it can be made in green sand leaving its own core, but that usually can only be approached in commercial practice. In the discussion of casting methods the authors briefly described the general fields of application and the advantages of each.

Discuss Effect of Titanium

Third session on aluminum and magnesium was held Tuesday morning. Hiram Brown, Solar Aircraft Co., Des Moines, Iowa, and H. R. Youngkrantz, Apex Smelting Co., Chicago, were chairmen, and the first paper on "Effect of Titanium on Grain Size and Tensile Properties of an Aluminum—4.5 Per Cent Copper Casting Alloy," by W. E. Sicha and R. C. Boehm, Aluminum Co. of America, Cleveland, was presented by Mr. Boehm. Investigation indicated that grain refinement by addition of titanium was effected by particles of $TiAl_3$ which were reduced in size in passing through the peritectic range and formed nuclei to initiate crystallization in the melt. Grain refinement was dependent on the pouring temperature, holding time after titanium addition, and the number of times the alloy was melted. There was no detectable loss of titanium with remelting. Tensile properties obtained with variations in titanium resulted from beneficial effect of grain refinement, deleterious effect of undissolved $TiAl_3$ particles, undesirable slight coarsening of insoluble alpha aluminum-iron-silicon constituent at the grain boundaries, and effect of retarded artificial aging which was proportional to the quantity of titanium added.

In a written discussion Walter Bonsack, Apex Smelting Co., Cleveland, disagreed with the authors' conclusion that nucleation was the basis for grain refinement and stated that he believed that cloud dispersion or col-

(*Continued on page* 145)

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(*Continued from page* 142)

loid formation of $TiAl_3$, which formed envelopes around the grains, prevented their growth. R. A. Quadt, American Smelting & Refining Co., Perth Amboy, N. J., described some tests in which a 0.15 per cent titanium bearing alloy was held at long periods at 1400°F and slugs poured at various periods until the grain coarsened. Then the aluminum was oxidized from the melt until 0.25 per cent Ti was present which resulted in grain refinement. Melt then was diluted with aluminum to reduce the titanium content; whereupon grain coarsening took place.

Second paper by W. E. Sicha and R. C. Boehm described a fluidity test for aluminum and was presented by Mr. Sicha. Casting is in form of a spiral ribbon 1/16-in. thick and 1-3/4 in. wide, poured in the center. Mold is made in green sand, preferably on a squeezer machine to eliminate ramming differences. Mold must be level when poured. Metal pouring temperature should be controlled within 5°F. Crucible holding about 20 lb metal is used, and three to five spirals should be poured to establish a fluidity value for any individual lot of metal. While the fluidity rating should be based on the volume of the spiral in precision work, informative comparisons can be made on the basis of spiral weights.

Alloy Presented Superior Properties

Concluding paper was entitled "Aluminum - zinc - magnesium - copper Casting Alloys," by L. W. Eastwood, Battelle Memorial Institute, Columbus, O., and the late L. W. Kempf, Aluminum Co. of America. Alloys studied contained from 0 to 1.75 per cent Cu, 3 to 13 per cent Zn, and 0 to 1.0 per cent Mg, and it appeared that an alloy containing 0.4 per cent Cu, 0.15 per cent Fe, 0.08 per cent Si, 6.6 per cent Zn, 0.33 per cent Mg, 0.25 per cent Cr, and 0.15 per cent Ti possessed the maximum combination of strength, ductility and resistance to corrosion.

In the discussion J. E. Holzworth, Frontier Bronze Corp., Niagara Falls, N. Y., pointed out that better properties, including corrosion resistance, are obtained when the copper content is held below 0.3 per cent. David Basch, Almin Ltd., Schenectady, N. Y., said that an indication of the importance of the particular alloy was indicated by the fact that many million pounds of castings had been produced since it was possible to obtain high strength without the necessity of heat treatment.

A well attended roundtable luncheon was held by the Aluminum and Magnesium Division Tuesday noon, with Walter J. Klayer, Aluminum Industries, Cincinnati, and Marvin E. Gantz, American Magnesium Corp., Cleveland, as co-chairmen. Following the luncheon L. J. Ebert, Case Institute of Technology, Cleveland, presented a paper describing "The Development of a Permanent Mold for Aluminum Tensile Test Bars," which was prepared in co-operation with R. E. Spear and George Sachs also of Case Institute. Mold containing two specimens gated from a central sprue is designed so that it can be operated after brief instruction.

Gating is into the heavy sections just above and below the reduced section of the bars so that trimming is not difficult. Mold is hinged at the bottom and given a protective coating in operation. Temperature of mold operation is between 600 and 800°F, rate of pouring is between 0.20 and 0.60 lb per sec, pouring temperature from 1250 to 1300°F, and the specimens remain in the mold from 1.5 to 4 minutes.

HEAT TRANSFER COMMITTEE

Reports on Year's Activities

As in previous years, the report on various investigations of the AFA Heat Transfer Committee attracted considerable interest when it was presented during the convention. The Tuesday afternoon session devoted to this subject comprised four papers, in addition to the summary report of the committee chairman Dr. Harry A. Schwartz, National Malleable & Steel Castings Co., and was capably presided over by E. C. Troy, National Engineering Co., Philadelphia, and Howard F. Taylor, Massachusetts Institute of Technology.

Work of the committee last year consisted largely of rounding out and elaborating work reported in 1946. This included a study at Battelle Memorial Institute dealing with heat transfer in a sand mixture which supplements previous work on three separate grain sizes. Activities at the heat flow analyzer laboratory at Columbia University, under the direction of Dr. V. Paschkis, covered the correlation of bleeding tests made last year on aluminum and cast iron. The committee report indicated there is now ample evidence that the electric analogy method employed at the Columbia laboratory—the technique of which was described in detail in AFA *Transactions*, p. 90, 1945—produces useful results, both in the case of unidirectional heat transfer and in the case of heat transfer in three directions.

The first of three discussions by Dr. Paschkis dealt with a comparison of bleeding tests and tests by the electric analogy method on pure aluminum. Data employed for bleeding tests were those reported a year ago by H. Y. Hunsicker, Cleveland Research Division, Aluminum Co. of America, Cleveland. The comparison of results by the two methods showed close agreement. In a similar study of solidification of white iron castings, the tests made on the electric analyzer checked reasonably well with bleeding tests carried out by National Malleable & Steel Castings Co. As pointed out by the committee, it is difficult to make accurate bleeding tests on a material having a considerable freezing range, and therefore a fairly wide zone in which the material is only partially frozen. In the case of iron a dendritic formation is encountered which does not prevail in steel and other metals, thereby interfering with accuracy of bleeding tests on cast iron. However, as mentioned in subsequent discussion by Howard Taylor, it is reasonable to assume that, if data developed by electrical measurement is confirmed by bleeding tests on such metals as steel and aluminum, the electric analogy method should give equally accurate results on iron.

Dr. Paschkis' third paper covered the solidification of steel spheres. This described the establishment of cooling curves for 4½ and 6-in. diameter steel spheres poured at temperatures between 2740 and 3010° F. In addition, the data determined by the heat and mass flow analyzer were compared with experiments carried out by Briggs and Gezelius (reported in part in "Studies on Solidification and Contraction in Steel Castings," AFA *Transactions*, p. 274, 1935). In most instances the values obtained from the two sources checked closely. The question of whether or not a correlation between solidification rates of various shapes is obtainable, however, is answered negatively by Dr. Paschkis' data. For instance, the ratio of time of solidification for a slab and a sphere of equal surface area, with slab thickness equal to

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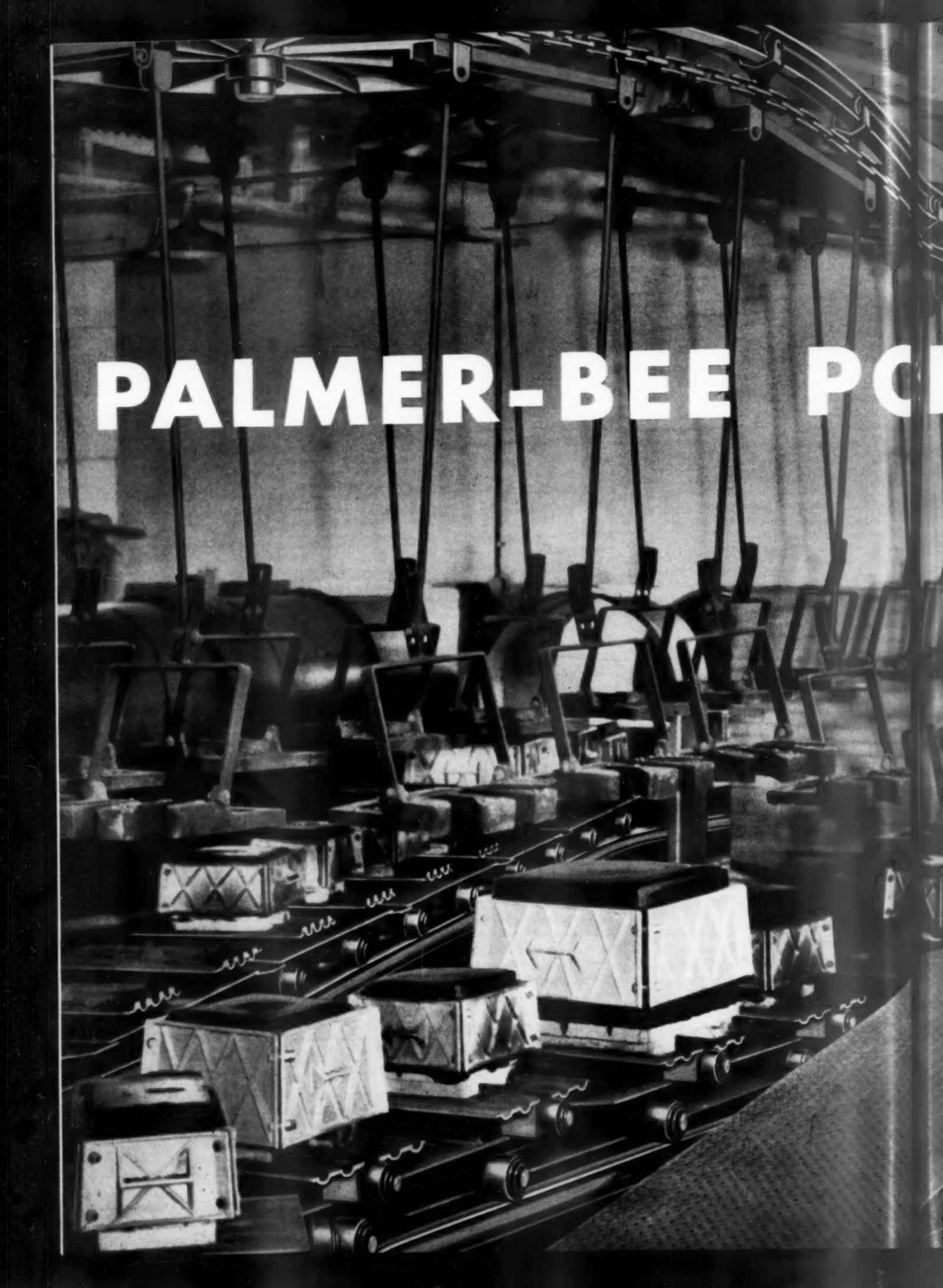
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Westminster at Grand Trunk Railway • Detroit 12, Mich.

(*Continued from page* 145)
sphere diameter, varies for different pouring temperatures.

The paper, "Thermal Conductivity of a Sand Mixture," by C. F. Lucks, O. L. Linebrink and K. L. Johnson, Battelle Memorial Institute, Columbus, O., was discussed by Howard Taylor in the absence of the authors. The Battelle study concerned heat transfer measurements of a mixture containing two of the three sands on which individual studies were reported a year ago. An appended report on a theoretical determination of dry sand thermal conductivity, prepared by Dr. J. C. Bell showed close agreement exists between values obtained in this manner and those from the experiments, both for individual sands and the sand mixture made from the two sands.

MALLEABLE IRON SESSIONS

Cover Alloys, Testing

THREE papers comprised the opening session of the Malleable Division at which C. F. Lauenstein, Link-Belt Co., Indianapolis, presided, and W. D. McMillan, International Harvester Co., Chicago, was co-chairman.

Effect of common alloying elements on the tensile properties of malleable iron was the subject of the first paper by Dr. H. A. Schwartz and W. K. Bock, National Malleable & Steel Castings Co., Cleveland, and presented by the latter. It was stated that the effect of alloying elements is so much obscured by other operating variables that any deductions from routine tests and analyses are open to suspicion. Direct experimental exploration indicates that, as expected, any alloy dissolving in ferrite strengthens the matrix of malleable iron.

Among other conclusions arrived at by the authors were the following:

"Silicon probably increases the sprawliness of graphite sufficiently to overbalance its strengthening effect on the matrix.

"Effect of a unit of any alloy decreases progressively as the amount of that alloy increases.

"The cumulative effect of all the alloys can be approximated by converting the several concentrations into an equivalent amount of a single alloy.

"Very roughly for such conversion, silicon and chromium are of equal potency, phosphorous is equivalent to about 6½ times as much silicon, and a unit of manganese to about one-half unit of silicon.

"Changes in concentration in a metal containing as much alloy constituent as malleable iron cannot be expected to produce great changes in strength."

Construction and operation of an oil-fired malleable iron holding furnace was described by F. Coghlin, Jr., metallurgist, Albion Malleable Iron Co., Albion, Mich. The complete duplex melting unit consists of two identical holding furnaces, both having an established overloaded capacity of 65 tons, and two 84-in. water-cooled cupolas lined down to 60 in. in the melting zone. The air furnaces are operated on alternate days, but to meet increasing production demands, both cupolas are used for each day's heat.

Described by the speaker were the refractory layout, the oil burner system, the atmosphere control system, operating methods and data, and some brief comparisons with coal firing of the holding furnaces. Advantages of oil firing were enumerated as follows: Lower fuel preparation costs; lower fuel costs; lower refractory and refractory maintenance costs; ability to hold greater furnace tonnages; improved iron analysis control through atmosphere control; less maintenance of fuel supply equipment, and more uniform operation.

In conclusion, Mr. Coghlin stated that oil is generally known to be an acceptable fuel for an increasing number of applications. As a holding furnace heating medium, it has proved to be an efficient answer to the melting problem which confronted his company two years ago. With further use and development of the equipment, many more advantages of utilization undoubtedly will be recognized and put to gainful purpose.

Final presentation at this session was the exchange paper of the French Foundry Technical Association prepared by Gabriel Joly, head of cast iron metallurgy, Foundry Industry Technical Center, Paris, and read on his behalf by C. O. Burgess, Union Carbide & Carbon Corp., Niagara Falls, N. Y. Title of the paper was "Influence of Chromium on Graphitization of White Cast Iron."

The author arrived at the conclusion that chromium retards the rate of decomposition of cementite during the first stage of graphitization as well as the rate of decomposition of pearlite. Its retarding action is not as effective in the second stage of graphitization as in the first stage. Less than 0.002 per cent boron added to the molten metal before pouring does not influence the rate of decomposition of carbides in the first stage of graphitization. On the other hand, it reduces considerably the time necessary to effect decomposition of pearlite. The diameter of the nodules of graphite is reduced at the same time their number is increased.

Second session devoted to malleable iron featured two papers and was presided over by C. F. Joseph, Central Foundry Division, General Motors Corp., Saginaw, Mich. Eric Whelander, Union Malleable Iron Works, Deere & Co., East Moline, Ill., was co-chairman.

"Application of Correlation in the Malleable Iron Foundry" was the subject discussed by Robert G. Seidel, National Malleable & Steel Castings Co., Cleveland. It is often desirable and sometimes necessary to observe the relationship which occurs between two or more variables. The foundry is confronted continually with problems too complex for solution by observation or rule-of-thumb methods.

Many Questions Raised

Among problems of this nature cited by Mr. Seidel were: How should the chemical composition be changed to effect a certain change in tensile properties; or what factors cause scrap casting; or what effect does molding sand condition have on losses; and the like. Too often, he said, these problems are solved by reason that a certain thing was done in the past—so it should be done now. Frequently, the conditions are known to have changed but, for lack of anything better, the same analysis is applied. In light of the success correlation techniques have had in so many fields, it seems within reason to apply it to foundry problems.

After explaining the technique of correlation, the speaker applied it to some foundry problems and arrived at obvious conclusions. However, purpose of the paper was not to solve specific problems, but to point out possibilities in using correlation techniques. Examples were chosen to show that correlation does not give a definite yes or no answer to a problem, but provides a tool that may be used profitably in judging a situation.

In a second paper, C. Schneider and L. Ulsenheimer, National Malleable & Steel Castings Co., Cleveland, discussed "Production Hardness Testing in a Malleable Shop." Two methods for measuring brinell hardness of pearlitic malleable cast-

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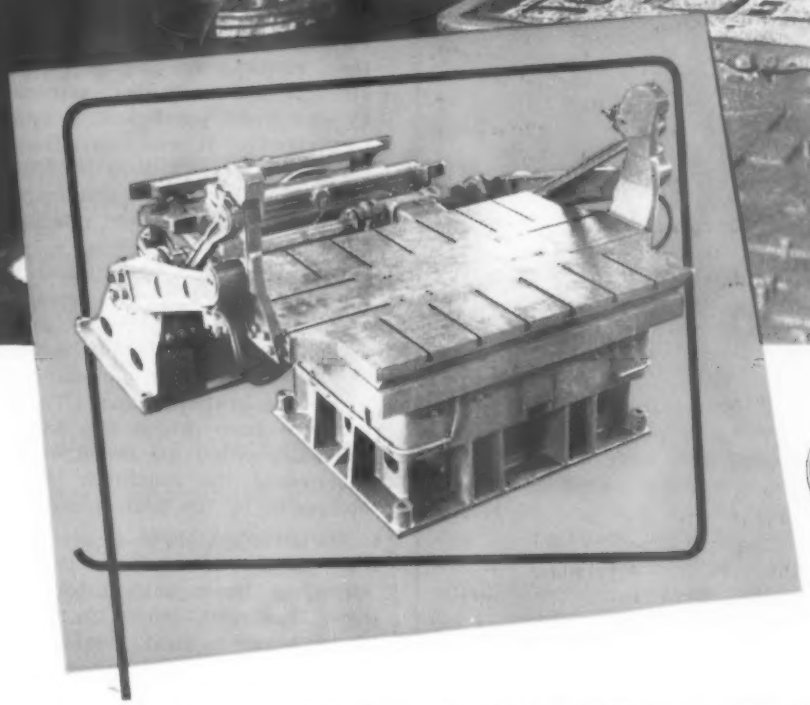
This Foundry is a Good Place to Work

Whitin Machine Works



This Massachusetts foundry, established over 100 years ago, is completely equipped for the production of textile machinery castings. It is a good place to work because sound management has kept it abreast of the latest developments in machinery and accessory equipment. Facilities include sand handling and preparation equipment, conveyors and traveling cranes for heavier molds, and cupola control equipment. The company produces an excess of one million castings per month, ranging in weight from less than one ounce to 2000 lbs.

This plant *also* uses a number of Herman Pneumatic Molding Machines. The 6000 lb. series machine illustrated is simple to operate. After the mold is jarred to proper density, jarring automatically stops by timer control. One valve assures swift, smooth, steady hydraulic action for mold rollover and pattern draw. Pattern draw equalizer adjusts itself to all irregularities in flask or bottom board. For further details of this machine, write the address below.

MOLDING **HERMAN** MACHINES

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH, PA.

(*Continued from page* 148)

ings were considered. First method is that of applying the brinell load of 3000-kg through a 10-mm ball manually or automatically. Diameter of the impression made in the casting is measured by means of a brinell microscope and this value is converted to brinell hardness number.

In the second method, the hardness is determined by means of a direct-reading machine first by applying a 1500-kg preload, resetting the dial to zero and then applying the full 3000-kg load. The dial on the machine then indicates the hardness of the casting. Constant checking of the direct reading machine with frequent calibration is necessary. The authors pointed out that in this, as in many other operations, there are opportunities for error.

This paper was of interest because traditionally the foundry has checked hardness of malleable castings by means of a test lug, and this method has been and still is considered the most acceptable way for determining this characteristic. However, hardness as determined by the brinell method is not considered a too reliable measure of machinability in the range of malleable iron.

Manganese-Sulphur Ratio

With introduction of pearlitic malleable, use of the brinell method became necessary. Entering this field early, the Cleveland Works of National Malleable has met many problems in production handling of hardness testing by this method. As tonnage of the material increased and the flow of the product through the shop accelerated, improved techniques were required. Primary requirement was to keep pace with volume demand, and today's operations represent the experience required in keeping step.

J. E. Rehder, Bureau of Mines, Ottawa, Canada, presented his paper, "Effect of Manganese-Sulphur Ratio on the Rate of Anneal of Blackheart Malleable Iron," at the third malleable session, Tuesday. G. A. Vennerholm, Ford Motor Co., Dearborn, Mich., presided, with W. B. McFerrin, Electro Metallurgical Co., Detroit, as co-chairman.

Mr. Rehder stated that the object of his investigation was to determine, under controlled conditions so that other factors will be constant, the ratio of manganese to sulphur in white cast iron suitable for making blackheart malleable iron within a minimum annealing time. The sulphur ahd manganese contents must be suitably balanced in order to obtain minimum annealing cycles, since an excess of either manganese or sulphur decreases the rate of decomposition of cementite and thereby increases the time necessary for complete annealing.

Tests were conducted by Mr. Rehder on two series of test bars in which the manganese content was varied. One series contained 0.09 per cent sulphur and the other 0.21 per cent sulphur, other constituents being normal amounts used in commercial malleable foundries.

Results of the investigation show that in white cast irons with 0.08 and 0.21 per cent sulphur, variation in the manganese-sulphur ratio between 1.8 and 5.0 causes little change in the times necessary for first stage annealing. Second stage annealing time is sensitive to the ratio of manganese to sulphur, the sensitivity increasing with sulphur content. The manganese content at which minimum annealing time is obtained is given by the equation, % Mn = (1.7 x % S) + 0.15. The only change detected in the microstructure of fully annealed samples as the manganese-sulphur ratio increases is a trend towards more irregular shape of temper carbon nodules.

NEW EMBLEM: Gray Iron Founders' Society Inc. recently adopted a new emblem with a central design featuring a cupola and receiving ladle, symbols which typify gray iron foundry operations. The society is distributing plaques of the emblem to its more than 600 member companies. Plaques will be deep etched and finished in two tones of silver, mounted on walnut. The society also has adopted a new slogan: "Make It Better With Gray Iron."

Discussion brought out the comment that an excess of manganese is better than an excess of sulphur. And in answer to a question about the use of high sulphur irons, Mr. Rehder stated that high sulphur irons work satisfactorily if the sulphur is properly covered by manganese.

In answer to the question as to whether proper manganese-sulphur balancing would eliminate hot tearing, Mr. Rehder said that the presence of iron sulphide causes hot tears, and it is not present—or present in only minute quantities—when the manganese-sulphur balance is properly maintained.

"Pearlitic Malleable Irons, Plain and Alloyed," a paper prepared by D J. Reese, International Nickel Co., New York, and Richard Schneidewind, University of Michigan, Ann Arbor, Mich., was presented by Mr. Schneidewind to conclude the third session.

Investigate Mechanical Properties

The authors investigated the mechanical properties of ferritic and pearlitic malleable irons, plain and alloyed, placing particular emphasis on the relationship between design strength and toughness as measured by the yield point and elongation, respectively. It was found that this relationship might vary widely but that with proper heat treatment the yield points bore a fixed relationship with elongation.

Best results were obtained when the tempering temperature was kept about 1200° F to obtain the greatest amount of stress relief and spheroidization with minimum amount of second stage graphitization. The temperature from which the iron was originally either air or oil quenched determined the maximum strength obtainable by the heat treatment.

Oil-quenched irons showed higher maximum yield points than air-quenched irons until after proper heat treatment, when the relationships between yield point and per cent elongation were the same. Mr. Schneidewind went on to say that at a given yield strength, oil-quenched irons usually have lower tensile strengths than air-quenched irons.

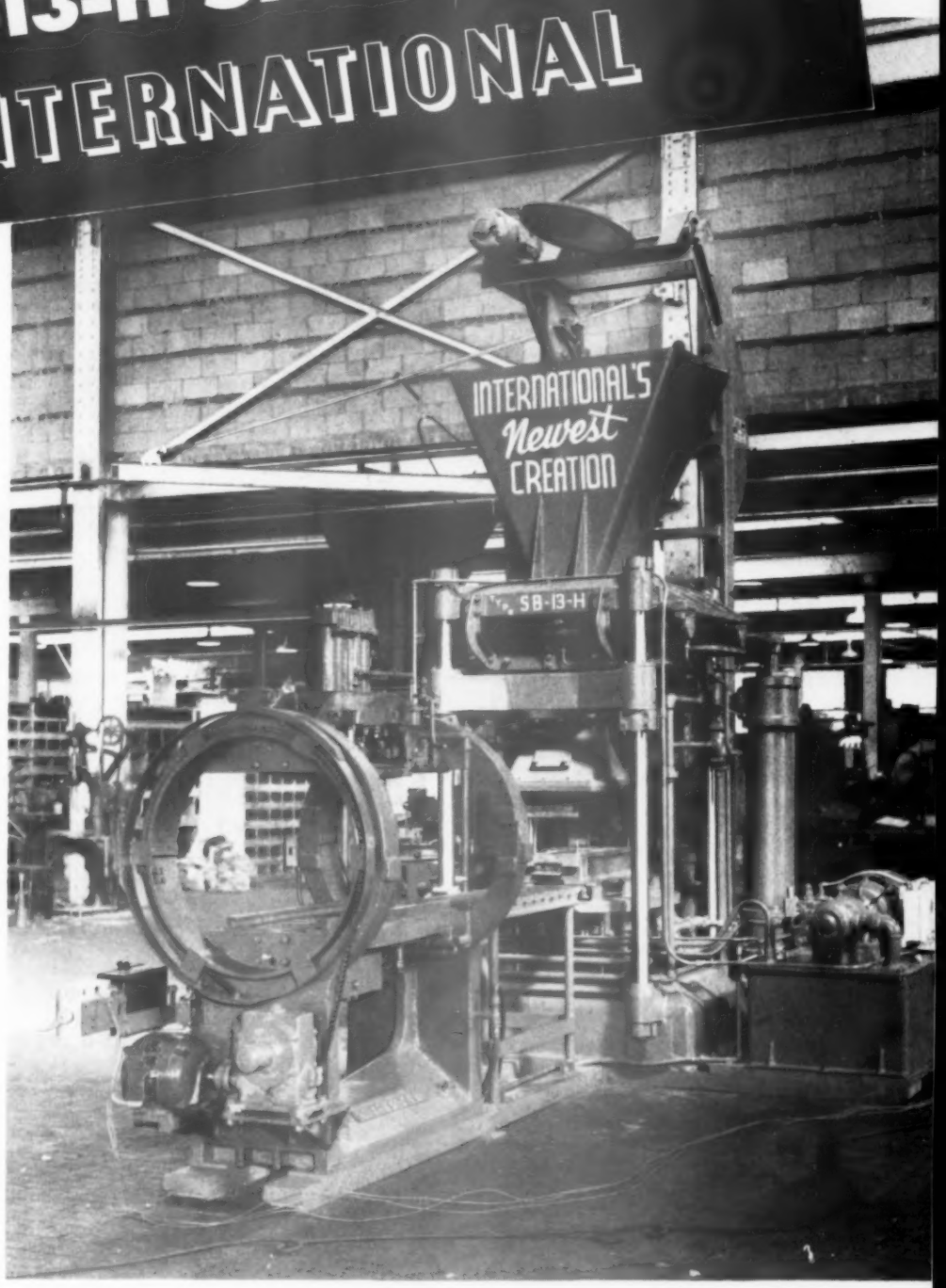
Tempering a quenched iron results, during the first part of the tempering cycle, in an increase in elongation with little reduction in yield strength. As the tempering time is increased, an increase in elongation with a proportional decrease in yield strength is obtained, and the relationship between yield and elongation becomes fixed.

Fully annealed pearlitic malleable irons, properly alloyed and heat

(*Continued on page* 152)

Did you see this unit at Philadelphia?

TYPE SB-13-H SAND BLOWER *by* INTERNATIONAL



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Core Box Rollers are standard equipment in the blower. Extra heavy, rugged construction.

INTERNATIONAL
MOLDING MACHINE COMPANY

LA GRANGE PARK, ILLINOIS

(*Continued from page* 150)

treated, gave 5000 to 10,000 psi greater yield point for a given elongation than unalloyed irons.

The malleable roundtable luncheon, sponsored by the Malleable Division and held on the second day of the convention, was well attended. J. H. Lansing, Malleable Founders' Society, Cleveland, presided, and A. M. Fulton, Northern Malleable Iron Co., St. Paul, served as co-chairman. Subject of discussion was "Malleable Foundry Mechanization" and was introduced by a brief address by R. J. Anderson, Belle City Malleable Iron Co., Racine, Wis. Discussion which followed was of the question and answer type.

EDUCATIONAL ACTIVITIES

Seen Needing More Emphasis

PROGRESS is being shown in educational work of the foundry industry but only a start has been made and much remains to be done, it was brought out at convention sessions devoted to this subject. The Educational Division's program was concentrated on the convention's opening day when two sessions, one a dinner meeting, and the division's business meeting were held. These were followed by the annual Engineering School Graduates' luncheon on Wednesday.

Program of the opening session, presided over by Prof. W. H. Ruten, Polytechnic Institute of Brooklyn, Brooklyn, N. Y., and L. G Probst, National Engineering Co., Chicago, comprised a paper, followed by a panel discussion on the subject of recruiting and training. In his paper on "Engineering Education for the Foundry Industry," George K. Dreher, executive director, Foundry Educational Foundation, Cleveland, pointed out there are an estimated 19,000 management positions in the foundry industry. If only one-half of these positions are to be filled by engineering graduates, the industry is faced with generations of a continuing effort to supply candidates for such education.

Mr. Dreher's paper had for its purposes (1) To re-crystalize the objectives of engineering education as applied to the foundry industry; (2) To provide an interpretation of engineering education for the present executive, managerial and supervisory members of the industry; (3) To provide an avenue of constructive criticism and suggestions which, in turn, will serve as a basis for a more thoroughly refined analysis of industry requirements. In connection with the first purpose he pointed out that no four or five-year collegiate curriculum can accomplish the necessary education which a so-called foundry engineer would require. "There is a field of foundry engineering that will be served by all kinds of engineers," he added.

The second purpose interpreted engineering education to the industry as being a grounding in fundamentals to which specific abilities can be readily added. This is in contrast to some of the thinking in management that the university should produce a thoroughly prepared graduate capable of entering into active administrative duties upon employment. No university program in the country can achieve this result, the speaker stated. At the same time, universities offering a full program of engineering education (including metallurgical) can meet the needs of the foundry industry with very little modification of present courses.

Mr. Dreher emphasized that the training in foundry techniques and procedure is by precedent the responsibility of industry. This point also was stressed in subsequent discussion by Prof. George J. Barker, University of Wisconsin, who stated that the universities cannot be expected to do a complete job of training the young foundry engineer, and that the lack of an adequate training program for the graduate when he is preparing to enter a foundry has been one reason why he has not been attracted to the industry in the past.

Prof. Barker stated that results of a recent study indicated that, of approximately 52,000 engineering graduates this year, nearly 7000 will have had some foundry instruction. However, only about 120 of these are expected to enter the foundry industry, which means that fewer than 3 per cent of the country's foundries can expect to secure one of this year's engineering graduates. He added that many schools are interested in and will develop foundry courses if industry shows a demand for technically trained men.

Participants in the subsequent panel discussion included Prof. Barker; F. B. Skeates, Link-Belt Co., Chicago; H. L. Rosse, Eddystone (Pa.) Borough Schools, and Prof. R. S. Tour, University of Cincinnati. Discussion was general on the subject of how to attract young men to the foundry industry. B. D. Claffey, Acme Aluminum Alloys Inc., Dayton, O., charged that a poor job has been done in selling the industry to high school boys, thereby intensifying the problem of attracting the university graduate. F. G. Sefing, International Nickel Co., and Educational Division chairman, also suggested an examination of the industry—not the boys—for an answer to the question of why the latter are not interested in foundry work. Both Prof. D. C. Williams, Ohio State University, and Anthony Haswell, Dayton Malleable Iron Co., Dayton, O., pointed out that the only way to get young men into the industry is to go after them. The latter also urged that the progress of new men be followed closely inasmuch as they can be excellent salesmen in attracting additional men. In connection with the work of the Foundry Educational Foundation Mr. Haswell indicated that it and the AFA plan to broaden their educational program in coming years.

Training Program Is Inadequate

The Educational Division dinner meeting Monday evening was the occasion for an even livelier discussion session on educational activities. A. W. Gregg, Whiting Corp., Harvey, Ill., presided, with D. F. Lane, Bethlehem Steel Co., Sparrows Point, Md., co-chairman. Stimulating the discussion was a provocative address by M. J. Gregory, formerly associated with Caterpillar Tractor Co., Peoria, Ill., in which, with obvious intent, he emphasized the adverse side of the foundry personnel picture. Specifically, Mr. Gregory expressed discouragement over the type of personnel which will be operating foundries a few years from now, in view of the lack of attention given in the past to recruiting and training men. As proof, he pointed to the fact many companies—both large and small—must resort to advertising for men to fill positions for which an occupant would have been available had adequate attention been given to a program of training and promotion.

In answer, B. D. Claffey admitted to no defeatist attitude and pointed out that the foundry industry's future rests not with the top strata of management, but with the lower ranks, into which better men are being introduced. He added, however, that while the foundry can provide the individual as many opportunities as any other industry, it is up to the foundry to demonstrate what it has to offer. In similar vein, Anthony Haswell declared he considered the greatest problem to be that of convincing the foundry industry of the need for a comprehensive educational program. The Foundry Educational

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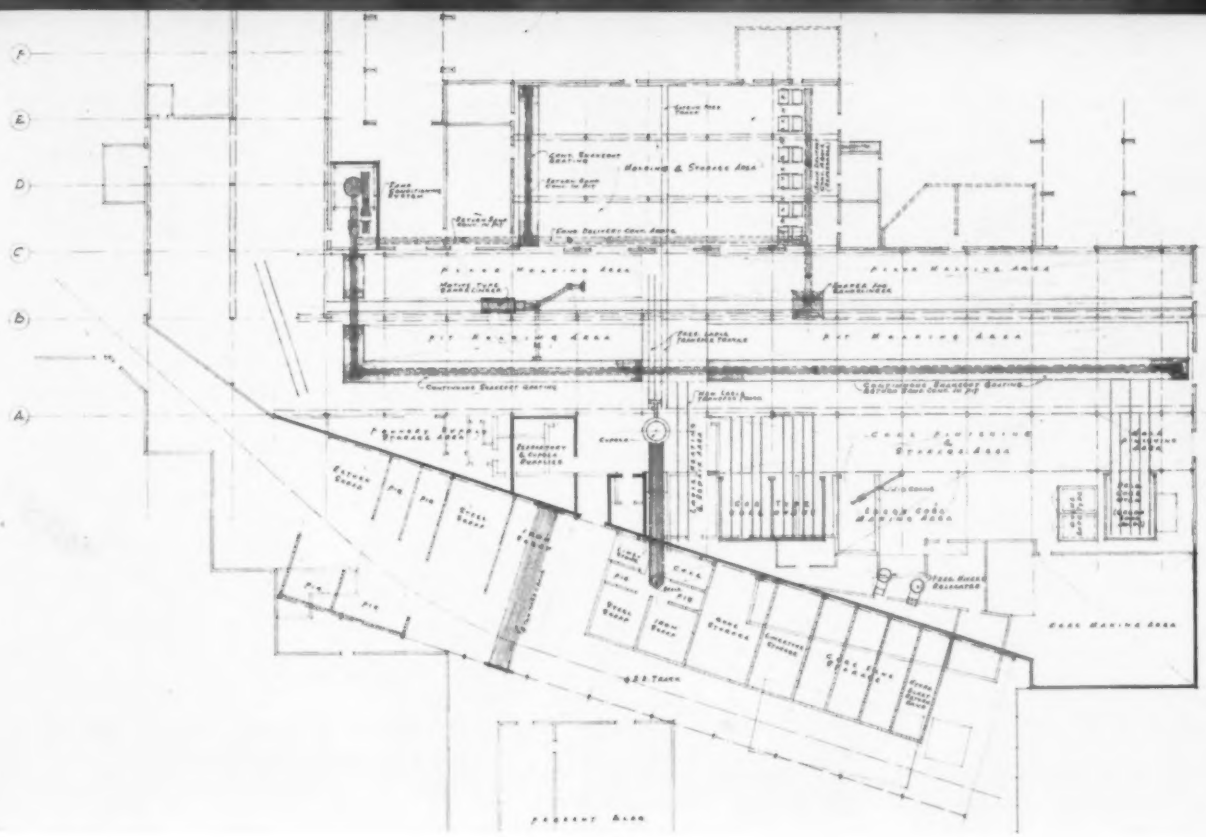

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(*Continued from page* 152)

Foundation, he pointed out, is attacking only a limited part of the training task, and lower level training must be conducted locally.

Approximately 60 engineering school graduates attended the Wednesday noon luncheon sponsored by the Educational Division. Presiding was H. H. Judson, Minneapolis-Moline Power Implement Co., Minneapolis, with C. V. Nass, Pettibone-Mulliken Corp., Chicago, as co-chairman. Addressing the group on "Engineering Education," Prof. R. M. Brick, University of Pennsylvania, stressed the need for the type of instructor capable of interesting students in the scientific side of foundry work, rather than one able to discuss only the mechanical phases of castings production.

BRASS AND BRONZE PAPERS

Stress Foundry Practice

AN ANIMATED session on the perennial subject of gas in brass and bronze castings followed a round-table luncheon, Monday, which opened the technical program of the Brass and Bronze Division. B. A. Miller, Baldwin Locomotive Works and R. J. Keeley, Ajax Metal Co., served as chairman and co-chairman at the luncheon meeting presented under the title "Recent Developments in the Melting of Brass and Bronze." H. L. Smith, Federated Metals Division, American Smelting & Refining Co., led the discussion and ably handled the barrage of questions and opinions voiced by a capacity audience.

Before the discussion the chairman introduced Admiral H. Wallin, commander, Philadelphia Naval Shipyard. In a thoughtful and straightforward address, lightened at times by touches of wit, the admiral directed attention to the fact that the Navy is a huge industrial organization working along the same lines as any industrial organization which functions as a free enterprise. He also deprecated the idea that the brass hats of either the Army or Navy have any desire or intention of taking over or usurping the legislative or executive functions of the government.

According to Mr. Smith, gas may be taken or forced into the metal during melting, pouring, or while lying in the mold. He described the origin, action and effect of hydrogen gas, the usually active agent, and a product of water vapor. Gas may be developed from the fuel, from water in the air line, from the atmosphere, or in some instances from new and insufficiently dried furnace lining. Carbon particles from the fuel constitute another source of contamination.

Where free hydrogen gas is present from any cause, a certain amount may be trapped during the pouring operation. In the mold an excess amount of steam may be converted or broken down into its component parts hydrogen and oxygen. Some gas escapes, but a certain amount may remain during solidification and thus cause porosity in the casting.

Several members expressed opinions on the theory that a certain amount of gas in metal is or is not advantageous. A lively exchange of opinion was precipitated by a member who inquired whether gas in the charged material carried through the furnace and reappeared in the casting. Majority held that the condition is not hereditary. Melted and handled properly, gassy condition in the charged material disappears during melting. The discussion closed on an interchange of opinion regarding the placing and efficacy of risers.

At the Monday afternoon session under the joint chairmanship of H. M. St. John, Crane Co., Chicago, and J. J. Curran, Walworth Co., Greensburg Pa., one paper was presented by G. K. Eggleston and V. A. Simpson, Barnes Mfg. Co., Mansfield, O., and a second was presented by F. L. Wolf, Mansfield O. In the first paper, "An Approach To Quality Control in Castings Production," the authors discussed their method of controlling quality of products. Manufacturing standards and process sheets are set up first. Keeping accurate records develops a history on each part. This enables the quality control man to get at the cause of excessive scrap production immediately and to take the necessary remedial steps.

In the absence of the author, the second paper, "Ingot Metal vs. Virgin Metal," was presented by W. Romanoff, H. Kramer & Co., Chicago. The description of a series of tests indicated that in the production of valves, refined copper-base ingot metal of ASTM specification B30-45T Class 5 A offered many advantages over virgin metal. Ingot metal cost was considerably less than that of virgin metal at the time the tests were conducted. Use of ingot showed a saving in storage room, in time consumed in making up charges, in preparation of metals for weighing and in alloying time.

Presented Several Advantages

Regardless of type of melting furnace, fracture of test plugs made from ingot metal were superior to those made from virgin metal. Melting loss was about the same on both. Foundry and test bench losses were lower on castings made from ingot metal. This metal easily met ASTM requirements for tensile strength and elongation. After chemical treatment, castings from ingot metal had a slight advantage over virgin metal in appearance.

Two papers were presented at the brass and bronze session Tuesday morning. R. M. Brick, University of Pennsylvania served as chairman, and C. A. Robeck, Gibson & Kirk Co., as co-chairman. The first paper, "The Technology of Copper-Lead Alloys," by R. W. K. Honeycombe, Melbourne, Australia, was the official exchange paper of the Institute of Australian Foundrymen. In the absence of the author, the paper was presented by William Ball, Jr., Magnus Brass Division, National Lead Co. Mr. Ball also officiated in a very able manner during the question period which followed the paper. Called upon for comment, H. J. Roast, well known commentator from Montreal, Pacific coast and way points, in his usual finished manner agreed with the speaker in his statement that Australian, American and Canadian brass and bronze foundry theory and practice are all alike.

The second paper at this session, "The Effect of Foundry Practice on the Properties of Some Binary Cop-

(*Continued on page* 157)

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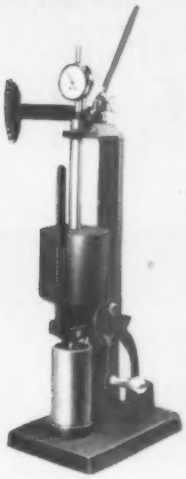

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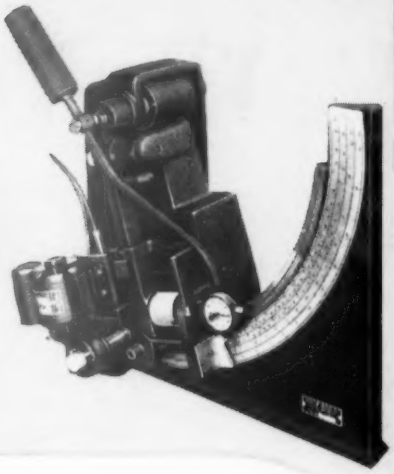
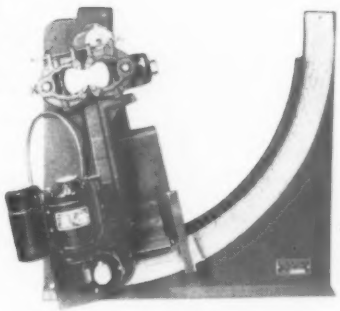


CORES

BAKING OVEN provides accurate control of core baking for core research and binder testing.

CORE PERMEABILITY TUBE is used with the Permmeter to determine the A.F.A. Permeability of baked cores and dried specimens.



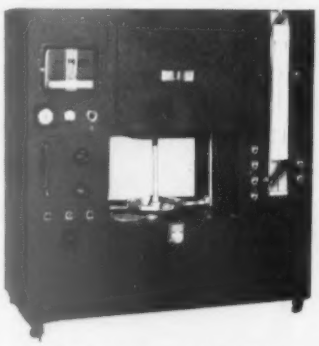
TENSILE CORE STRENGTH ACCESSORY attached to the Sand Strength machine determines tensile strength of baked core specimens.

GAS DETERMINATOR measures volume of gas released by any core or molding sand mixture—used also to check baking practice.

MOLDS

MOLD HARDNESS TESTER determines hardness of green sand molds or green cores—also compressive strength of mold surface in psi.

CORE HARDNESS TESTER measures surface hardness of baked cores and dry sand molds.



DILATOMETER: a complete high temperature testing laboratory. Predicts behavior of sand and core during pouring, solidification and shakeout.

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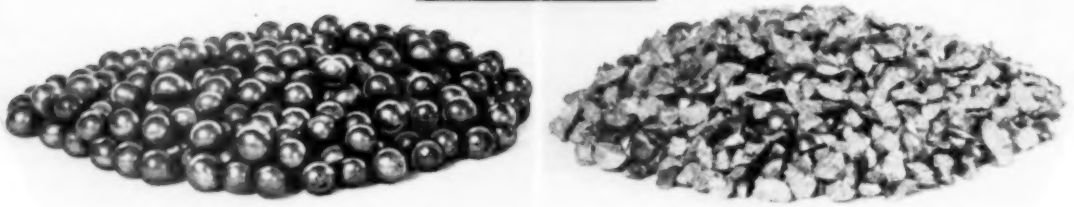

Outstanding toughness and extraordinary long life best describe Metal Blast **ANNEALSHOT** and **GRIT.**

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(*Continued from page* 154)

per-Silicon Alloys," by A. I. Krynitsky, W. P. Saunders and H. Stern, National Bureau of Standards, Washington, was presented by Mr. Krynitsky.

The following abstract, indicates the scope of the work and the manner in which it was conducted. In the first part of the work the influence of silicon content and pouring temperature on the physical properties was determined for a series of alloys containing 2 to 4.9 per cent silicon, melted and cast in air. The effect of design of tensile bar on the tensile properties also was ascertained. The authors are aware, of course, that the same melt quality may not be optimum for castings of various designs and purposes. In the second part, the physical properties of a selected alloy, copper plus 4.9 per cent silicon, cast under various ambient atmospheres were studied. Atmospheres included hydrogen, carbon monoxide, helium, air, carbon dioxide and nitrogen.

Tensile tests with the Navy 10B keel, fin gate and end gate types of bars showed that, in general, the highest tensile properties were secured with the Navy 10B bar. In most cases an increase in yield strength and ultimate tensile strength accompanied a decrease in pouring temperature. Increase in the silicon content increased the yield and ultimate strength values and the electrical resistivity, but decreased the reduction in area. Elongation increased with increased silicon content to 3.5 per cent, but decreased sharply with further silicon additions.

Castings made of the 4.9 per cent silicon alloy under atmospheres of hydrogen or carbon monoxide, poured at approximately 2140°F (1170°C) possessed lower ultimate strength, elongation and reduction in area than those made under other gases. Castings made under nitrogen showed the highest ultimate strength and elongation. Yield strength was practically unaffected by a change in atmosphere. Melting and pouring under different gases had little effect on the electrical resistivity and solid contraction of the 4.9 per cent silicon alloy.

No appreciable difference in density was observed for the different sections of the stepped bars, cast under helium, air, carbon dioxide and nitrogen. Densities of the bars prepared under hydrogen and carbon monoxide were considerably lower than those cast under other ambient atmospheres. Density values of the 1/8-in. sections in these two cases were considerably greater than those of the heavier sections.

Results obtained with the hydraulic pressure test indicated that the chief cause of leakage of the cylinders was the presence of interconnected shrinkage cavities due to inadequate feeding. Results obtained indicate that an increase in the proportion of the massive and banded constituents, interpreted as the kappa and alpha plus kappa phases, respectively, is associated with an increase in strength and a sharp decrease in elongation.

Results of a study on "A New Permeable Metal Casting Plaster," conducted by K. A. Miericke and E. S. Johnson, U. S. Gypsum Co., Chicago, were presented at the concluding brass and bronze session by Mr. Miericke. R. W. Parsons, Ohio Brass Co., Mansfield, O., presided at the meeting, and A. K. Higgins, Allis-Chalmers Mfg. Co., Milwaukee, was co-chairman.

After discussing some of the advantages and disadvantages of gypsum plasters with various additives as a molding compound for the casting of nonferrous metals, Mr. Miericke, outlined the aims of the recent study conducted with the co-operation of Mr. Johnson.

These objectives were to develop a plaster for use with nonferrous metals which would have a wide per-

(*Continued on page* 160)

NFA Administrative Council Meets in Philadelphia

ACCOMPANYING view of the administrative council of the National Founders Association was taken at a meeting of the group in the Warwick Hotel, Philadelphia, May 4. At this meeting the council projected the new publicity program to be carried in THE FOUNDRY, and made arrangements to gear the activities of the NFA to the ever-widening needs of the industry. Among the numerous other activities under consideration by the council regional meetings are planned.

Shown above, seated: C. S. Roberts, Dodge Steel Co.; Charles Wesson, Sargent & Co.; Thomas W. Pangborn, Pangborn Corp.; I. R. Wagner, Electric Steel Castings Co., association president; Herman Menck, Harnischfeger Corp.; D. C. Bakewell, Blaw-Knox Co. Standing: L. E. Roark, executive vice president; Ralph J. Teetor, Cadillac Malleable Iron Co.; A. V. Martens, Pekin Foundry & Mfg. Co.; Paul L. Arnold, U. S. Pipe & Foundry Co.; Franklin Farrel III, Farrel-Birmingham Co., association vice president; E. C. Hoenicke, Eaton Mfg. Co.

Eyes that put a hurry tag on a 450-lb. cas

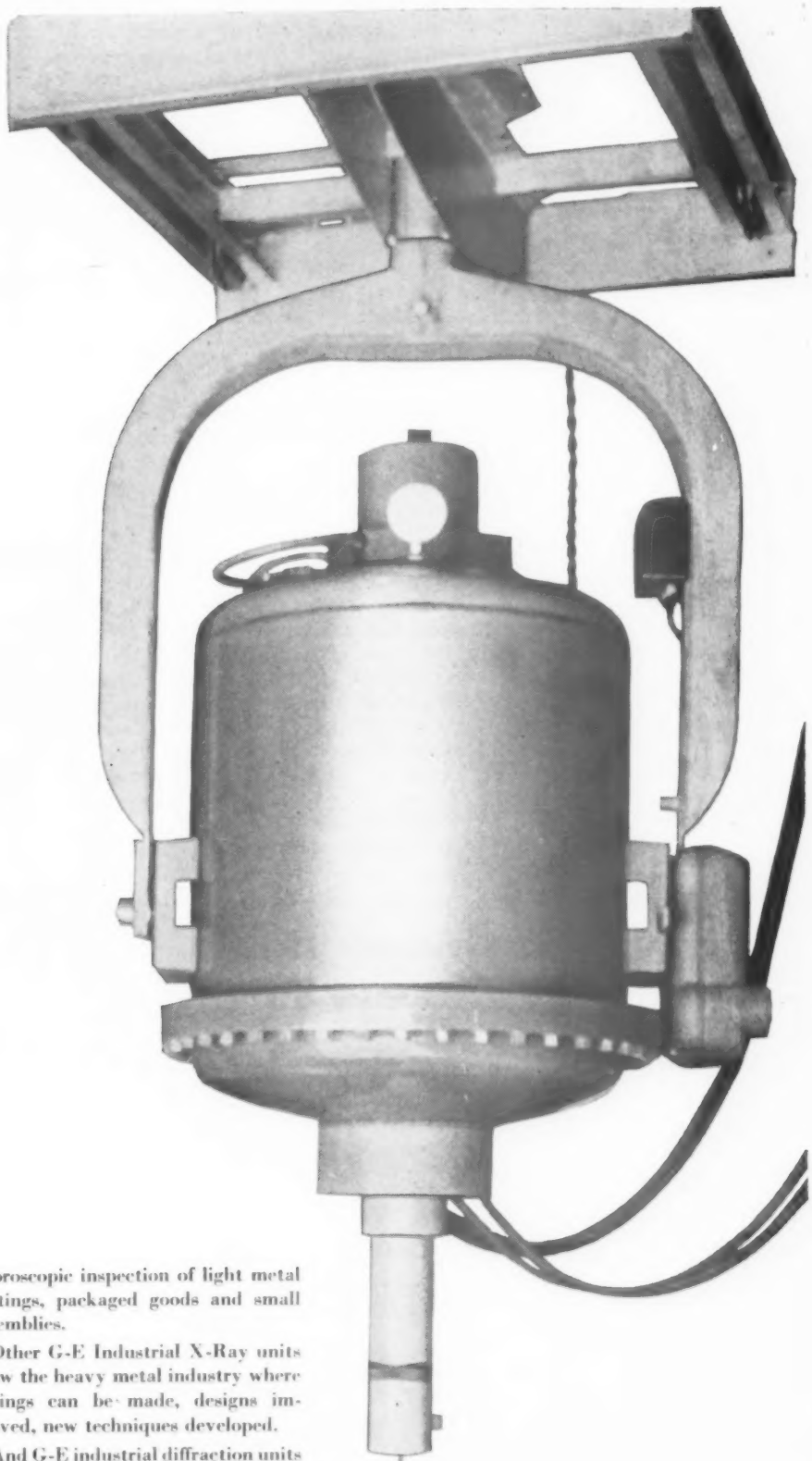
The job was RUSH! Routine inspection of the pilot casting called for visual inspection . . . physical test . . . sectioning of the stressed areas. A 10-day job.

What was worse, a serious defect could mean starting again from scratch.

Here is how General Electric Industrial X-Ray equipment in the plant saved the day—8 days, in fact. The casting was poured, heads and gates burned off, some rough chipping done. The 450-lb. casting was rushed to the set-up room and x-rayed. Time—3 hours 50 minutes.

Management studied the films. Flaws were spotted, but so were ways to eliminate them. Minor changes were made in casting technique. Production started within 48 hours! Acceptably flaw-free castings were delivered *on time*. The customer was well pleased; company prestige increased. Once again, General Electric Industrial X-Ray had helped speed production, curb waste—and paid for itself in the first few jobs it tackled.

In scores of foundries and factories, General Electric Industrial X-Ray has become an important *developmental* tool. It not only diagnoses, but suggests a treatment. G-E Industrial X-Ray engineers stand ready to help fit industrial x-ray to your production needs. They'll be glad to talk to you about it. Write or wire. General Electric X-Ray Corporation, Dept. F-37, 4855 McGeoch Ave., Milwaukee 14, Wisc.



lb. casting

neers in the application of x-ray industry, General Electric Indus- al X-Ray engineers have devoted re than 20 years to the develop- ent and construction of industrial ay equipment—have the practical owledge that comes only through perience.

Their research has resulted in a mplete line of industrial x-ray units, ch designed to do a specific job.

There are G-E conveyor units for fluoroscopic inspection of light metal castings, packaged goods and small assemblies.

Other G-E Industrial X-Ray units show the heavy metal industry where savings can be made, designs improved, new techniques developed.

And G-E industrial diffraction units provide quick solutions to a variety of problems involving behavior characteristics of materials, chemical composition and quantitative analysis.

GENERAL ELECTRIC X-RAY CORPORATION

General Electric X-Ray Corporation manufactures and distributes x-ray apparatus for industrial, dental and medical use; electromedical apparatus; x-ray and electromedical supplies and accessories.

(*Continued from page* 157)

meability range; produce as smooth a mold surface as is obtainable with present plasters; have greater mold strength, both as cast and after "burnout"; give better metal characteristics to any metal cast in it, and possess no undesirable characteristics not inherent in present plasters.

The research program was successful, according to Mr. Miericke, in developing plaster that meets these requirements. The new plaster is said to have the following advantages:

Permit attainment of any desired degree of permeability.

Complete dehydration of the mold is unnecessary. Only the free water need be removed, leaving the chemically combined water, which is liberated as steam through the permeable mold structure when the molten metal is poured. This serves as a chill to the metal and results in better metal characteristics, it is claimed.

Lower "burnout" temperatures are possible, thus reducing mold shrinkage. Furthermore, it is said that less time and less heat are required for "burnout."

Good mold strength in the wet and "burnout" stage results in less mold breakage and permits the pouring of larger castings. The fact that mold strength and permeability can be varied to fit any specific condition permits good operational flexibility.

Plant control methods are said to be relatively simple, and are based almost entirely on the wet density of the mold. Once this is established, mixing procedure can be standardized.

During the discussion period, Mr. Miericke stated that the new material is not suitable for use with the lost wax process because the wax gets into the pores and spoils the permeability of the plaster.

Correlation of x-ray findings with hydrostatic pressure tests of gun metal cast plates of various thicknesses under 250 psi for 15 minutes was shown in the final paper, which was prepared and presented by W. H. Baer, Naval Research Laboratory, Washington.

Purpose of the investigation described in the paper was to ascertain the value of radiography as a means of inspection of gun metal castings (nominal composition: Cu, 88 per cent; Sn, 8 per cent and Zn, 4 per cent). Tests were conducted on plates 1, 3/4, 1/2 and 1/4-in. thick. Observations on the 1-in. plates were classified into light, medium and concentrated shrinkage and shrinkage plus gas porosity.

Plates first were pressure tested and then, if found pressure tight, were radiographed. Observations made with radiography bore out the anticipated results obtained in pressure tests.

Opinion was expressed during the discussion period that radiographic inspections are not too reliable because procedures and voltages are not standardized. Reliability of such tests was further questioned because of the fact that false defects sometime appear. These are due to metal structure and other causes.

Pattern Sessions Are Well Attended

MORE than 200 attended the Tuesday afternoon technical session sponsored by the Pattern Division, with A. F. Pfeiffer, Allis-Chalmers Mfg. Co., Milwaukee, presiding and L. F. Tucker, City Pattern & Foundry Co., South Bend, Ind., acting as co-chairman.

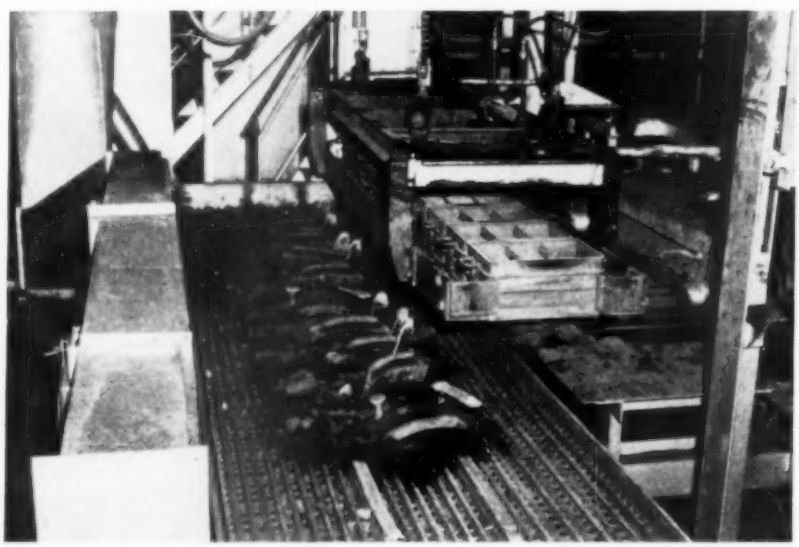
In his paper, "Core Box Design and Rigging for Core Blowing," H. J. Jacobson, Industrial Pattern Works, Chicago, described the progress that has been made in the last 30 years in the equipment and practices employed in the foundry industry. Three common types of coreboxes were described—the dump type, the vertical split and the horizontal split; the latter covering the widest scope.

Slides were shown of an aluminum corebox, and cross section of a completely ribbed box. High silicon aluminum was used, an alloy well adapted for corebox use. General shape of box and back ribbing designed to follow general contour of cavity were explained. Box-type ribbing was illustrated. In one corebox illustrated 102 vents were used, with three blow tubes leading into each cavity. Ratio of intake to exhaust was about 5 to 1. Speaker said this box was over vented, a more desirable feature than under venting.

Parting materials were discussed and illustrated. The most important point, the speaker said, is to prevent the box from leaking. Of 15 corebox materials tested by the speaker, drill rod was adapted, as it held up best under blast. Seal type ribbing was explained, and a short discussion of plastic and rubber coreboxes was given. Following the talk these coreboxes were discussed, with various speakers giving their experiences with them. Other points covered in the general discussion included the

(*Concluded on page* 162)

Single Operation Shakeout Machine



SHAKEOUT installations differ with plants. Here 11 flasks delivered by a special grab are being handled as one operation. Sand passes through the perforated deck, while castings move toward the discharge end. Mechanical discharge is accomplished by an elliptical motion, inclined to the horizontal. Its vertical component empties the flask and cleans the castings; horizontal component provides self-discharge off the end. Vibrating deck is supported on coil springs, to prevent impact damage to mechanism or castings and eliminate transmission of vibration to supporting structures. Photo courtesy Robins Conveyor Division, Passaic, N. J.

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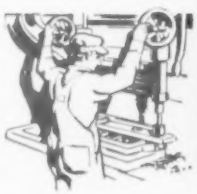

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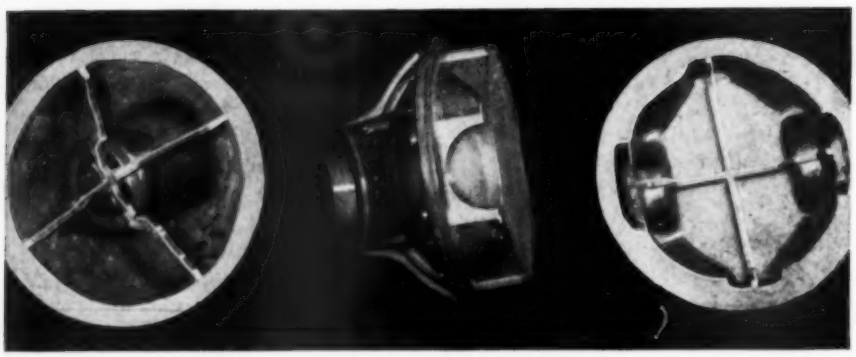
A NEW SERVICE

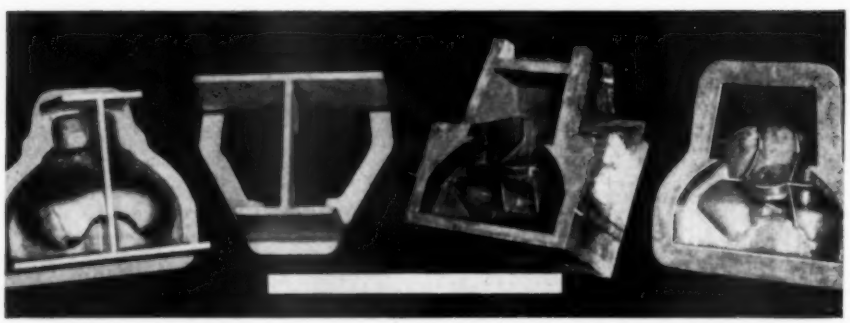
We announce to pattern shops and foundries that we can now furnish pattern and core box castings without the necessity of lightening core boxes or backing off master patterns or core boxes. If you will send us your master pattern or core box or core stick, we shall be glad to quote you and supply complete information.

Photographs by courtesy of Erie Malleable Iron Company

Photo shows face of pattern castings made from master pattern shown in center.



Pattern castings, showing method of lightening out.



Core box casting made from solid wood master core box, showing backing frame and method of backing off

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(*Concluded from page* 160)

life of coreboxes, brass facings, use of gray iron for boxes, and use of rubber inserts and blow holes.

Mr. Tucker, the co-chairman, read the second paper, "Metallizing Wood Patterns," in the absence of the author, H. A. Erbe, General Steel Casting Co., Granite City, Ill. Initial cost of patterns is disturbing to foundries, and the rate of deterioration depends on the care given them. Pattern preservation is important, therefore protectives are used to lengthen their usage. In spraying of patterns with zinc, it was noted that chipping occurred. If followed by a spray of copper, better results were obtained. It was indicated that patterns of maple, protected with shellac or lacquer are better than metallized soft wood patterns.

L. F. Tucker, City Pattern & Foundry Co. Inc., South Bend, Ind., presided at the pattern roundtable luncheon Wednesday. Co-chairman was H. K. Swanson, Swanson Pattern & Model Works, East Chicago, Ind. Martin Rintz, Continental Foundry & Machine Co., East Chicago, Ind., was discussion leader. He presented a short paper dealing with some of the problems of patternmakers, and then opened the meeting to general discussion.

Editor's Note: Concluding reports on technical sessions at the AFA meeting in Philadelphia will be presented next month.

Plan Conference on Apprenticeship

The fourth annual Eastern Seaboard Apprenticeship conference will be held at Lake Placid, N. Y., June 24-26, inclusive. The New York State Apprenticeship Council will serve as host, with the conference to be sponsored by the Apprenticeship Councils of various states and the Apprenticeship Training Service, United States Department of Labor. About 1500 are expected to attend, of whom, it is estimated, about 250 will be associated with the foundry industry.

Book Review

Trends In Retirement Planning, paper, 32 pages, 6 x 9 in., published by American Management Association, New York. Price 52 cents.

Current thinking by management and labor on employee retirement plans is reported in this 32-page publication which discusses employee, company and union attitudes on retirement plans and presents an analysis of trusteed plans, insured plans and methods to achieve lowered premium costs.

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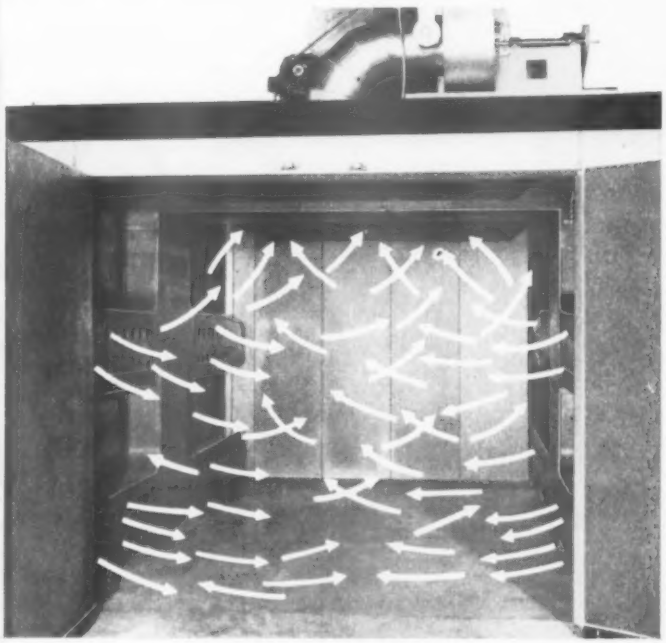

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OF WHICH THESE ARE A FEW EXAMPLES

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Gray Iron Jobbing Fdry.			3	1		2	1			7
Aircraft Manufacturer		1		1	3	1	1	2		9
Tire & Rubber Manufacturer						2	4	1		7
Lighting Equipment Manufacturer				1	1		2		2	6
Electrical Resistor Manufacturer		2	1	7	11	1	1		1	24
Motor Bus Manufacturer								10		10
Boiler and Radiator Manufacturer							2	2	2	6
Steel Jobbing Fdry.			2	3			1			6
Pump Manufacturer					1		1	1		3
Steel Jobbing Foundry				4				2		6
Electrical Manufacturer						1	1		2	4
Rubber Manufacturer		2		2			2			6
Refrigerator Manufacturer								4	1	5
Aluminum Jobbing Fdry.				3	1					4
Tire & Rubber Manufacturer	1	1	3	2	1					8
Permanent Mold Casting Fdry.			3	7						10

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AFA OFFICERS AND DIRECTORS

Elected at Annual Business Meeting

WILLIAM B. WALLIS, president, Pittsburgh Lectromelt Furnace Corp., Pittsburgh, was elected president of the American Foundrymen's Association at the annual business meeting held in Philadelphia, May 5. He will succeed Max Kuniansky, vice president and general manager, Lynchburg Foundry Co., Lynchburg, Va., at the annual meeting of the AFA board of directors this summer. At the same time Edwin W. Horlebein, president, Gibson & Kirk Co., Baltimore, will take office as vice president of the association.

New directors elected at Philadelphia for three years include: Thomas H. Benners Jr., T. H. Benners & Co., Birmingham; Norman J. Dunbeck, vice president, Eastern Clay Products Co., Jackson, O.; Alfred M. Fulton, vice president, Northern Malleable Iron Co., St. Paul; Robert R. Gregg, foundry manager, Reliance Regulator Corp., Alhambra, Calif., and Victor E. Zang, vice president, Unitcast Corp., Toledo, O. Max Kuniansky, retiring president, was elected a director to serve one year.

William B. Wallis

WILLIAM B. WALLIS, president, Pittsburgh Lectromelt Furnace Corp., Pittsburgh, has been active in affairs of the AFA and has served as a national director since 1943. Affiliated with the foundry industry for more than 36 years, he is a native of Pittsburgh and a graduate of Pennsylvania State College. In 1911 he was associated with the Cheat River hydroelectric development of West Penn Power Co., Pittsburgh, and the following year he spent in Idaho with the Great Shoshone & Twin Falls Power Co., Twin Falls. He returned to Pittsburgh in 1913 as assistant to the vice president in charge of operations of that company. In 1915 he entered the consulting engineering field with W. E. Moore & Co., Pittsburgh, where he remained until he joined Jessop Steel Co., Washington, Pa., four years later. He resigned as assistant general manager of that company in 1920, to become president of Pittsburgh Lectromelt Furnace Corp.

Edwin W. Horlebein

EDWIN W. HORLEBEIN, president of Gibson & Kirk Co., Baltimore, is a native of that city. He began his career with the Baltimore & Ohio Railroad as a machine apprentice in 1915. Following military service in World War I, he joined the engineering department of the Dixie Mfg. Co., Baltimore. He remained there until 1924, when he became president of Gibson & Kirk Co. Mr. Horlebein has served on the board of directors of the AFA since 1945. Previously, he headed, as its first chairman, the Chesapeake Chapter of that organization, of which he is a charter member. He has also served on the executive committee of the Brass and Bronze Division of the national organization. His affiliations with scientific groups include membership in American Institute of Mining and Metallurgical Engineers, American Society for Metals, British Institute of Metals, and others.

Thomas H. Benners Jr.

THOMAS H. BENNERS JR., managing partner of T. H. Benners & Co., Birmingham, was born in that city, attended public schools there, and was graduated from Virginia Military Institute in 1920, with a degree in chemical engineering. He became associated with Woodward Iron Co., Woodward, Ala., working in the laboratory and blast furnace department, and for a short time in sales. He joined T. H. Benners & Co. in 1921, where he has been engaged in the sale of foundry raw materials and coal. Mr. Benners has been active in the Birmingham Chapter of the AFA since its organization, and served as its chairman for the year 1946-47.

Norman J. Dunbeck

NORMAN J. DUNBECK, vice president, Eastern Clay Products Inc., Jackson, O., was born in Lancaster, N. Y. He received his early education in Rochester, was graduated from Catholic University of America in 1924, and worked for a time at Donner Steel Co., Buffalo, and Symington-Gould Corp., Rochester. He joined Eastern Clay Products in 1926, where he was put in charge of research and tests in the company's newly opened laboratory. He was named eastern plant manager in 1927, production manager in 1931 and was made vice president in 1936. With wide experience in foundry sand service work, Mr. Dunbeck has served as a member of the executive committee and various subcommittees of the Sand Research Division of the AFA. An active member of the Central Ohio Chapter of that organization, he served as its chairman during 1946-47.

Alfred M. Fulton

ALFRED M. FULTON, vice president, Northern Malleable Iron Co., St. Paul, was born in Chester County, Pa. He entered the foundry industry with Wilmington Malleable Iron Co., Wilmington, Del. Later he was associated with Baldwin Locomotive Works, Philadelphia, and Fort Pitt Malleable Iron Co., Pittsburgh. He moved to St. Paul in 1920, when he joined Northern Malleable Iron Co. Mr. Fulton has been a member of the AFA for many years, and has taken an active part in the work of several national technical committees, including the malleable handbook on recommended practices and program-papers groups. Last year he was chairman of its Malleable Division. He has also served as chairman of its Twin City Chapter.

Robert R. Gregg

ROBERT R. GREGG, foundry manager, Reliance Regulator Corp., Alhambra, Calif., was born on the Isle of Man and came to this country in 1907. He studied foundry practices in a number of iron, steel and nonferrous plants in United States and Canada. From 1914-27 he was associated with Steiger & Kerr Occidental Foundry, San Francisco, Hesse-Martin Iron Works, Portland, Oreg., and Keystone Iron & Steel Co., Los Angeles, also serving as consultant and apprentice instructor with the Industrial Association of San Francisco. He joined Reliance Regulator Corp. in 1927 as foundry superintendent, and has been foundry manager since 1940. Mr. Gregg was one of the organizers and the first president of the Southern California Chapter of the AFA and has been a member of the national organization since 1919. Well known throughout the castings industry, particularly for his work in bringing young men into the field and in apprentice training, he has also won recognition for his activities in management groups. Last July he was named to fill the unexpired term of George K. Dreher, retired, on the

(*Concluded on page* 168)

COLEMAN TOWER* OVENS

for BETTER CORES, SMOOTHER CASTINGS, LOWER COSTS

says **R. A. BLYWISE,**
Executive Vice President
The Republic Brass Company
Division of Briggs Mfg. Co.

"Our Coleman Tower Core Oven has proven itself a most satisfactory and self-amortizing investment since it was installed about two years ago. Our core department can now easily supply our mechanized foundry with all core requirements.

"You will be interested to know that we are getting a much more uniformly baked core which reflects itself in the fact that we are getting smoother castings and a reduction of our scrap casting loss. In addition, our core department personnel like the installation as our new oven has eliminated smoke and fume nuisance completely."

PATENTED OPEN CENTER: Provides close, efficient grouping of coremakers around the oven. The exclusive 3-way loading feature increases accessibility 300% over ordinary vertical oven designs. Cuts carry time... increases productivity.

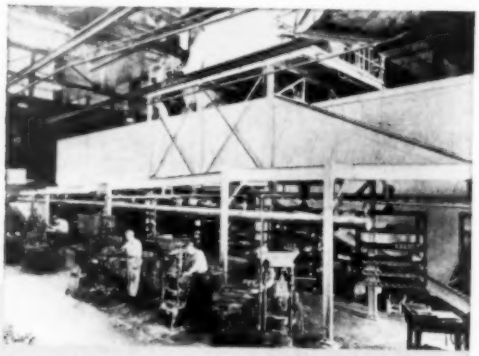
AMAZING FLOOR SAVING: The elimination of racks, aisleways, and large working space required by batch ovens permits savings up to 75% in floor area. Less space... greater output.

RECUPERATIVE COOLING SYSTEM: Cores are "smoked off" and cooled before they reach the unloading station, making for better working conditions. The heat recovered from the cores is used over again, resulting in large fuel savings.

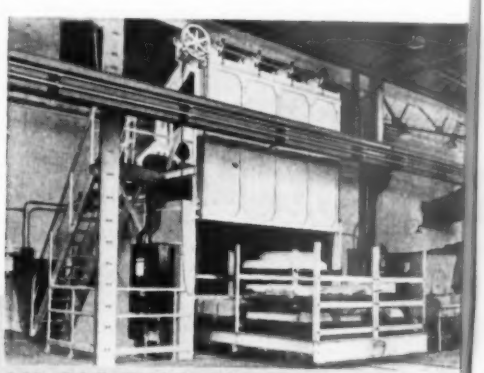
PERFECT BAKING: Eliminates rejects and make-overs. Coleman Heating Systems for gas, oil or stoker-coal; whichever fuel is most economical in your locality.

COLEMAN TOWER OVENS ARE BUILT IN A WIDE RANGE OF SIZES AND CAPACITIES

*Trade Mark Reg. U. S. Pat. Off.



COLEMAN HORIZONTAL CORE OVENS
Overhead conveyor ovens specially designed for large scale production foundries in such fields as agricultural, automotive, etc.



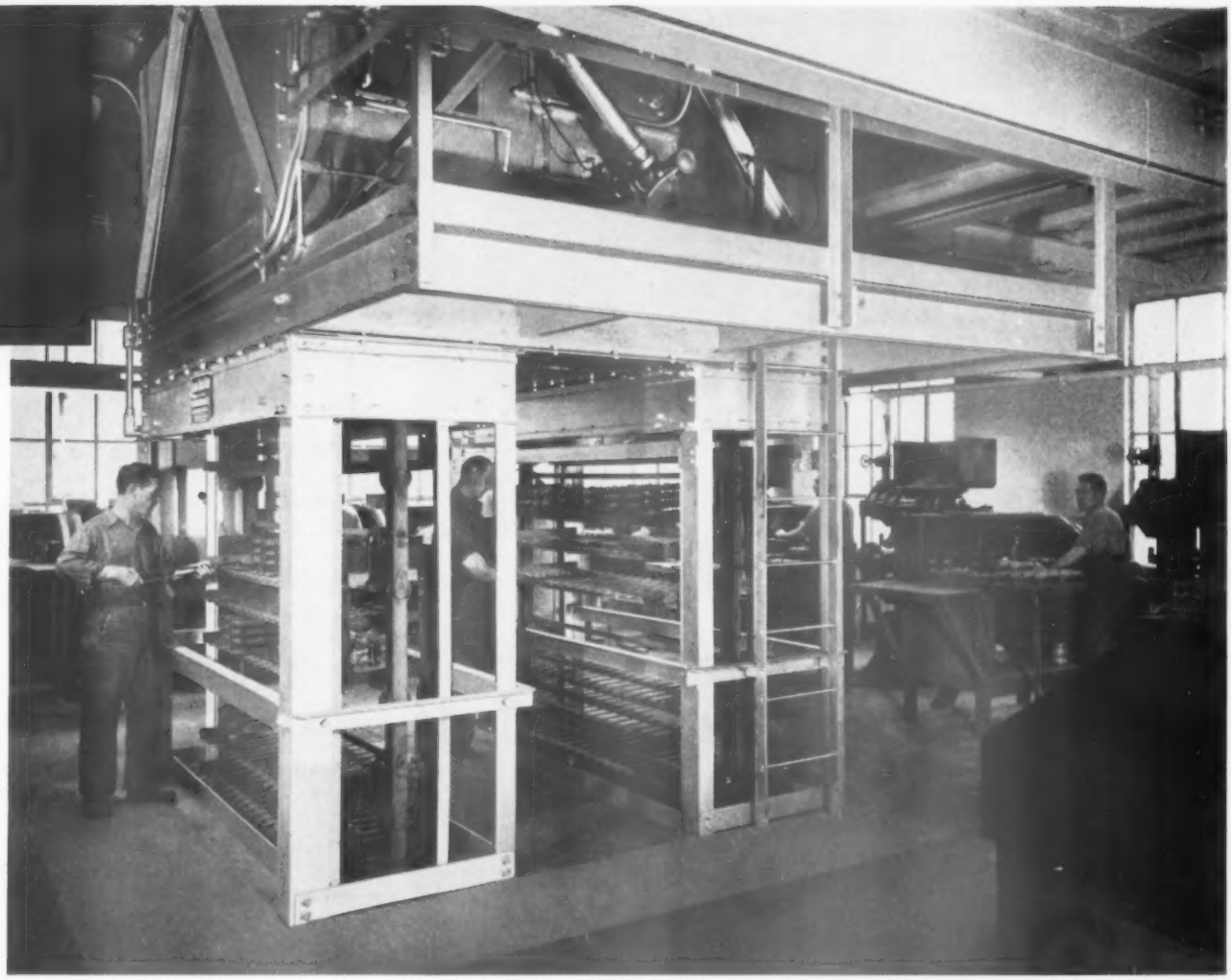
COLEMAN CAR-TYPE OVENS
For baking large cores or drying molds. Coleman Car-Type Ovens are used by most of the leading producers of heavy castings.

The FOUNDRY EQUIPMENT CO

CLEVELAND 13, OHIO, U. S. A.

BUIL AND

WORLD'S OLDEST AND LARGEST FOUNDRY OVEN SPECIALISTS OVER



Coleman Tower Oven at The Republic Brass Company, Division of Briggs Mfg. Co., Cleveland, Ohio

COLEMAN TRANSRACK OVENS

For use with portable racks to reduce handling labor. Very efficient where ample floor space is available.

OTHER MANUFACTURERS OF CAST BRASS PRODUCTS USING COLEMAN TOWER OVENS:

American Radiator & Standard Sanitary Corp.
Barnes Manufacturing Co.
Central Brass Mfg. Co.
A. Y. McDonald Mfg. Co.
Empire Brass Manufacturing Company, Ltd.
Scovill Manufacturing Co.
Schaible Company
Ohio Brass Company
Wolverine Brass Works
Walworth Company
Josam Products Foundry Co.
Chapman Valve Mfg. Co.
Johnson Bronze Company, Inc.
W. D. Allen Manufacturing Co.
Sully Brass Foundry, Division Neptune Meters Ltd.

COLEMAN TOWER OVENS ARE USED EXTENSIVELY IN LEADING FOUNDRIES PRODUCING GRAY IRON, MALLEABLE, STEEL, ALUMINUM AND MAGNESIUM CASTINGS.

WRITE TODAY FOR BULLETIN 48

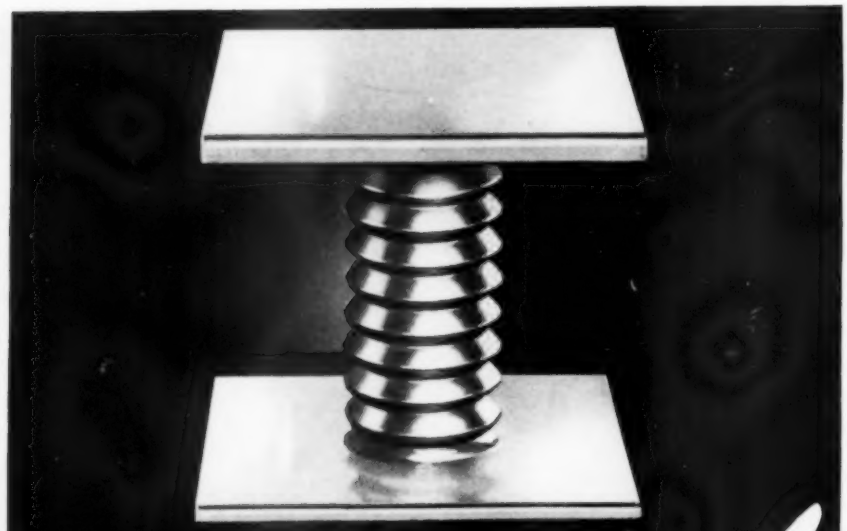
COMPANY

BUILDERS OF COLEMAN AND SWARTWOUT OVENS

MEMBER MANUFACTURERS ASSOCIATION INC. FOUNDRY EQUIPMENT

COLEMAN
CORE AND MOLD OVENS

OVER 9000 SUCCESSFUL INSTALLATIONS



Vital Details

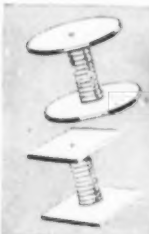
OF FOUNDRY PRODUCTION!

Compared to the castings in which they are used, chaplets and chills often appear to be trifles. Yet, to foundrymen who are striving for constant improvement in casting quality, they are details of vital importance.

Through years of close association and co-operation with the Foundry Industry, the makers of Milwaukee Chaplets have helped to develop several distinct types of chaplets and chills which have contributed to improved casting production.

The Milwaukee Double Head, Thread Stem Chaplet, pictured above, represents but one of the advancements in chaplet design represented in the *Milwaukee Line* of "Vital Details". It includes Standard Radius Chills, Schmitz Chaplets, Patented Adjustable Radius Chills, Special Chaplets and Related Specialties. Write for Samples and Prices.

MILWAUKEE CHAPLET & MFG. CO.
1025 SOUTH 40TH STREET • MILWAUKEE 4, WISCONSIN



MILWAUKEE CHAPLET

(*Concluded from page* 165)

board of directors for the national organization.

Victor E. Zang

VICTOR E. ZANG, vice president in charge of research and development, Unitcast Corp., Toledo, O., was born in that city, where he attended University of Toledo. He joined Unitcast Corp., then Industrial Steel Casting Co., as a chemist in 1922. He was appointed works manager in 1937 and was made vice president in charge of research and development last year. Mr. Zang is a charter member of the Toledo Chapter of the AFA, of which he was the first chairman. He is also a member of American Society for Metals and past chairman of its Toledo group, and American Institute of Mining and Metallurgical Engineers.

FOUNDRY SHOW

(*Continued from page* 75)

What caused this show to stand out as one of the best? It may have been the layout of the entire exhibition, the striking colors used in many of the most attractive displays, the large amount of heavy equipment towering above the majority of exhibits, the large number of machines that were in operation, or other features which were readily apparent. Again it may have been the many new things in the way of machines and materials which were available for inspection that really emphasized this show. More than likely, the excellence of attendance, both in quantity and quality, also contributed to the high standing of the Philadelphia show.

Exhibition visitors discerned a strong trend toward the design of new equipment to provide semiautomatic and automatic control of many foundry operations. This tendency is coupled with an acceleration of the movement toward the mechanization of operations. These new developments and improvements, which were featured so successfully in Philadelphia, are doing much in the modern foundry to limit the requirements of the human factor as sources of both energy and control.

This trend was particularly well illustrated in the field of molding machines, core blowers, cleaning room equipment, sand handling and preparation equipment, dust collection and disposal units, baking ovens, blowers, and furnaces, to name only a few. Many new and improved

(*Continued on page* 170)

Announcing

KROMECAST

A NEW CHROME-BASE, HIGH-STRENGTH

3100 F REFRACTORY CASTABLE

B&W KROMECAST...another original development by B&W... combines important advantages never before available in chrome-base castables or plastics.

B&W KROMECAST...in addition to supplying chemical resistance at high temperatures to attack by molten slags, mill scale, and other reactive products:

possesses the ability to support loads at elevated temperatures *and can be used in vertical walls and many types of roof arches without support.*

has unusual volume stability at temperatures as high as 3100 F.

can be poured like ordinary concrete, plastered in place, or applied with a cement gun.

B&W KROMECAST means less time spent in building and repairing furnaces. It means longer continuous operating periods. It means lower overall production costs. It opens the way for many new applications that were impossible with previously available chrome-base plastics or castables.

SUGGESTED APPLICATIONS

HEARTHS

FURNACE WALLS

FLOORS

CAR TOPS

DOOR AND FRAME LININGS

ELECTRIC FURNACE ROOFS

FORMING SPECIAL SHAPES

PATCHING

For complete information on this new, unique chrome-base refractory castable, write for Bulletin R-26—or call your local B&W Refractories Engineer.

R-315

B&W REFRACTORIES PRODUCTS

B&W 80 FIREBRICK • B&W JUNIOR FIREBRICK
B&W 80 GLASS TANK BLOCKS • B&W INSULATING FIREBRICK
B&W REFRACTORY CASTABLES, PLASTICS AND MORTARS

•

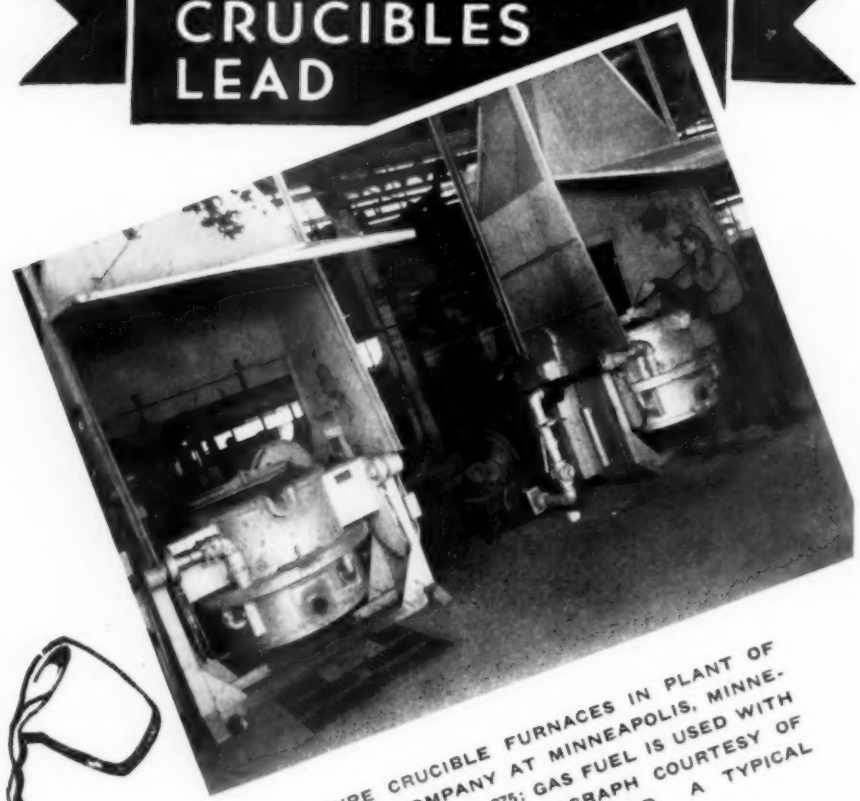
OTHER B&W PRODUCTS

Stationary & Marine Boilers and Component Equipment
Chemical Recovery Units... Seamless & Welded Tubes... Pulverizers
Fuel Burning Equipment... Pressure Vessels... Alloy Castings

BABCOCK & WILCOX

THE BABCOCK & WILCOX CO.
REFRACTORIES DIVISION
GENERAL OFFICES: 85 LIBERTY ST., NEW YORK 6, N.Y.
WORKS: AUGUSTA, GA.

ON ALL COUNTS CRUCIBLES LEAD



TILTING-TYPE CRUCIBLE FURNACES IN PLANT OF NORTHERN PUMP COMPANY AT MINNEAPOLIS, MINNESOTA. CRUCIBLES SIZE No. 275; GAS FUEL IS USED WITH PROPORTIONAL MIXERS. PHOTOGRAPH COURTESY OF NORTHERN ORDNANCE INCORPORATED. A TYPICAL CRUCIBLE INSTALLATION.

A foundry operating with modern Crucible Melting equipment has these advantages:

1. Control of Quality
2. Moderate Investment Cost
3. Low Cost of Labor

Add up these three advantages and you have freedom from worry in non-ferrous melting seldom possible with any but the Crucible method.

There is more in **Crucible Melters' Handbook** about satisfaction to be gained. Ask for this book; mailed free.

CRUCIBLE MANUFACTURERS ASSOCIATION

90 WEST STREET, NEW YORK 6, NEW YORK

(*Concluded from page* 168)

products also were shown by the producers of foundry supplies, and some of these materials were the subject of frequent discussions during foundry week.

It was a great show. Undoubtedly its influence will be felt for some time in the future as the foundry industry continues to move toward better practices and a better product.—*Frank G. Steinebach.*

Issues Open House Bulletin

National Metal Trades Association, 122 South Michigan Ave., Chicago, has published the second of its industrial relations reports, "The Open House in Industry," intended to emphasize recognition of the plant open house as a good-will potential between management and the community. The 32-page bulletin discusses the purpose of the open house, when it should be held, whom to invite, responsibility for arrangements, details of publicity, traffic and transportation, reception, exhibits, plant tours, protection, safety, first aid, and clean up. Four pages of illustrations include photographs of plant tour maps, welcome booklets, programs and actual open house scenes. Copies of the folder may be obtained at $1 each from the association.

Will Hold Meeting

Thirty-fifth annual convention of the American Electroplaters' Society will be held at Atlantic City, N. J., on June 28 to July 1. Technical sessions will deal with latest developments in copper, brass, bronze, chromium, nickel, and zinc plating; barrel plating; plating on plastics; evaluation of strip plating and of decorative deposits; measurements of stress in deposits; metal cleaning; electropolishing; phosphatizing; spray finishing, and coating of metal finishes. An industrial finishing exposition sponsored by the society will be held in conjunction with the convention.

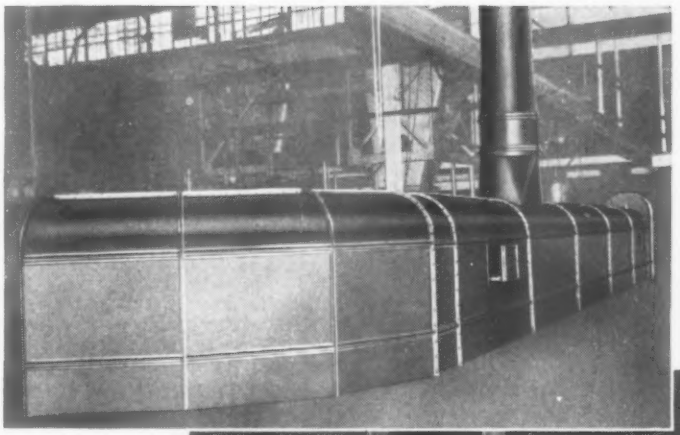
Book Review

1947 *Supplement to Book of ASTM Standard,* Part I-A Ferrous Metals, paper, 403 pages, 6 x 9 inches, published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3. Price $4.

This book contains the revised standards and the new and revised tentatives in the ferrous metals field that have been accepted since the ap-

(*Concluded on page* 172)

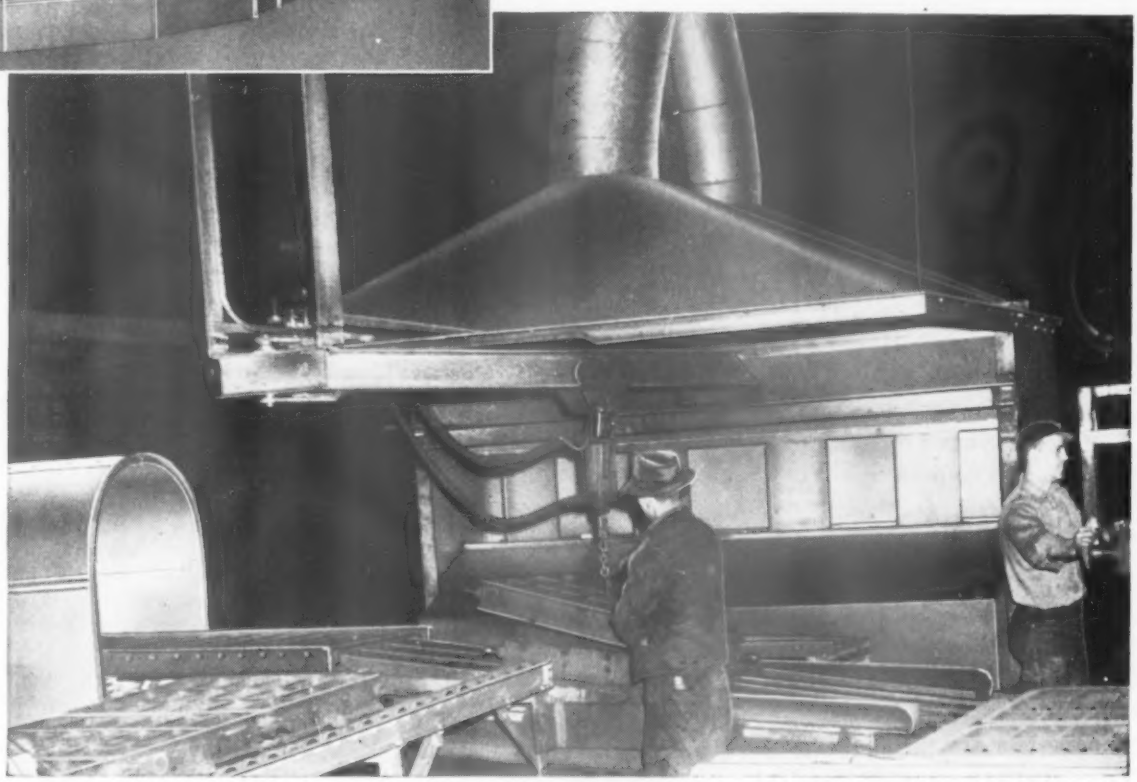
Single KIRK & BLUM SYSTEM WORKS *Three* WAYS!



1. Removes Fumes

2. Cools Molds

3. Removes Dust



In the plant of a leading manufacturer of cast iron radiation one KIRK & BLUM System does a three-fold job, cooling molds and controlling fumes and dust.

After casting, the molds enter the cooling tunnel seen in the small photo; a large volume of air passes through the tunnel, cooling the molds and removing the fumes. The molds are then delivered to the shakeout, where clean air flows over the grate . . . keeps workers at top efficiency. In the lower photo note the adjustable volume control plates in the shakeout hood which permit easy control of air where needed.

This Kirk & Blum installation is another example of the skill and experience of Kirk & Blum Engineers . . . experts with air. If you want to control fumes, dust or cooling, Kirk & Blum Engineers will gladly offer their recommendations without obligation. The Kirk & Blum Mfg. Company, 2808 Spring Grove Ave., Cincinnati 25, Ohio.

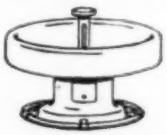
FOR CLEAN AIR . . . THE INVISIBLE TOOL

KIRK AND BLUM

DUST CONTROL SYSTEMS

"The Height of Efficiency"

3 Piping Connections Do The Work of 27

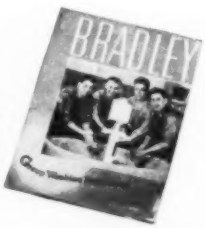
9 "Single-Person" Wash Basins Serving 1 Person Each require	1 Bradley Washfountain Serves 8 to 10 Persons at one time
	
9 Hot Water 9 Drain 9 Cold Water	1 Hot Water 1 Drain 1 Cold Water
27 Piping Connections	ONLY 3 Piping Connections

Because *one* Bradley Washfountain serves 8 to 10 workers simultaneously it takes the place of 8 to 10 "single-person" wash basins. Fewer individual installations thus make possible worthwhile savings on hard-to-get piping and fittings. Less labor and time are required to install Bradley Washfountains than numerous wash basins. Another cost-saving, maintenance-reducing feature is the Bradley sprayhead which does the work of 16 to 20 faucets; water consumption is reduced as much as 75%.

Make a survey of your washroom requirements NOW,—our catalog shows arrangements and plans as well as the various models. Bradleys are Nationally Distributed Through Plumbing Wholesalers. BRADLEY WASHFOUNTAIN CO., 2217 W. Michigan Street, Milwaukee 1, Wisconsin.

Write for Latest 4-Color Catalog

For further details and specifications write for 24-page Catalog 4701.



BRADLEY washfountains

(*Concluded from page* 170)

pearance of the American Society for Testing Materials' 1946 *Book of Standard.* The 28 standards are replacements of existing standards; similarly 23 of the 41 tentatives are replacements, while the remaining 18 are published for the first time. Eleven tentatives adopted as standard in 1947 without revision are listed in the contents, but not published in this supplement.

Yellow stickers accompany the supplement, for attachment to appropriate pages of the 1946 *Book of Standards,* Part I-A, to call attention to any standards, which have been superseded by standards in this supplement, or which have been completely withdrawn.

Book Review

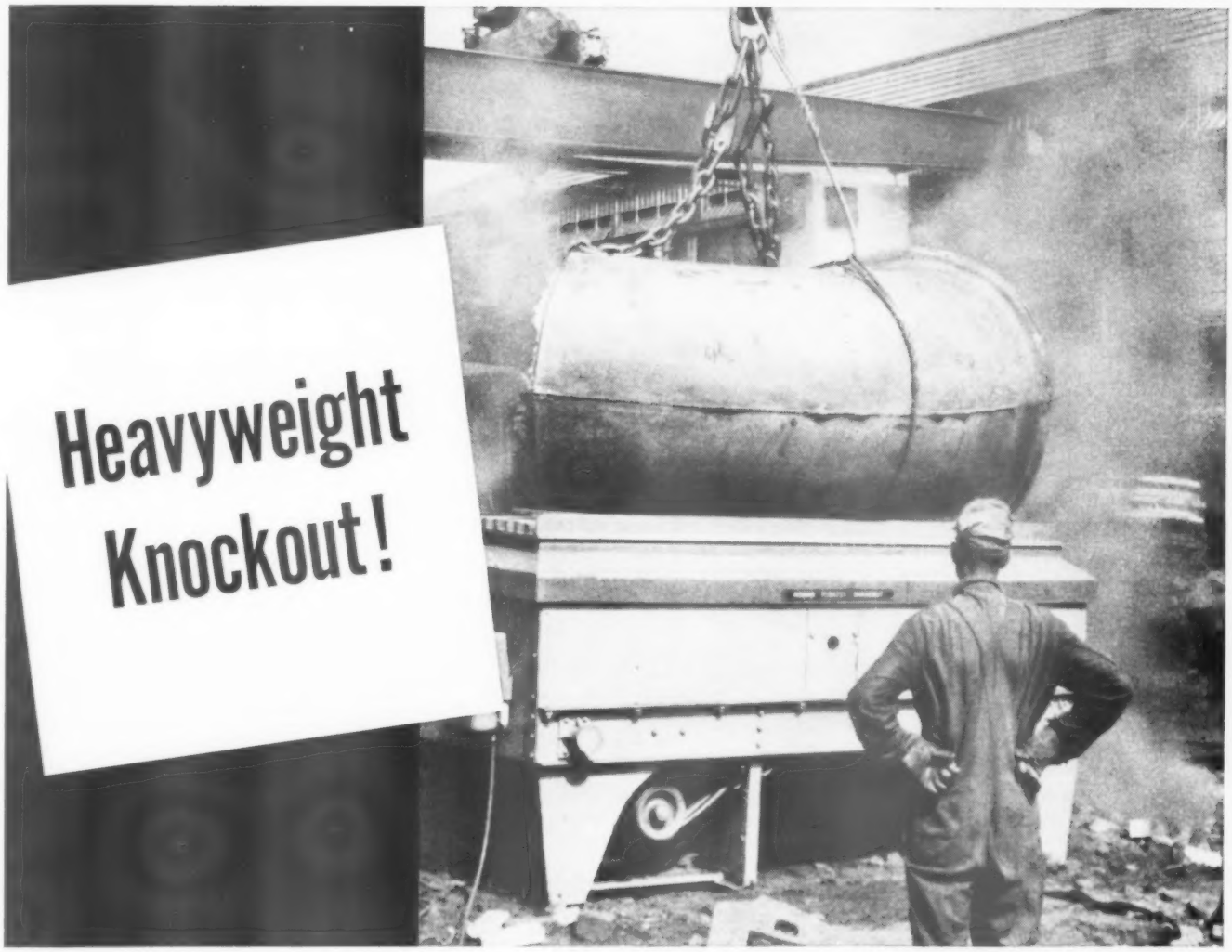
Steel and Its Heat Treatment, Vol. I, by D. K. Bullens and the metallurgical staff, Battelle Memorial Institute, cloth, 489 pages, 6 x 9 in., published by John Wiley & Sons Inc., New York. Price $6.

Volume one in this fifth edition of the book explains the principles behind heat treatment of both carbon and alloy steel and stresses the definitions and terminology necessary for understanding the subject. The authors go into the uses and limitation of tests to evaluate suitability of steel for heat treatment and to determine proper engineering uses for heat-treated products. Charts and diagrams supplement the text.

Volume II, priced at $4, gives the practical applications of the heat treating principles covered in the first volume. Furnaces, quenching media and other tools are discussed and photographs shown of actual installations in operation. The authors not only show how to use the principles, they also warn of the penalties which follow disobedience of them. They delve into methods of preventing cracking and distortion, preparation of steel for machining, the relation of heat treatment to welding, and heat treatment of steel castings, malleable iron and cast iron.

Adds New Division

Whiting Corp., Harvey Ill., has acquired the business and plant of Spencer & Morris Inc., Los Angeles, and will continue the manufacture of the tramrail-type of materials handling systems which Spencer & Morris has distributed widely during the last 25 years. The plant will be operated as the Spencer-Morris Division of the Whiting Corp.



Versatile Robins Floatex Shakeout knocks out huge elbow . . . in jig-time

It takes a lot of power to shake out and knock out the big fellows. And the Robins Floatex Shakeout has what it takes to do *both* jobs.

In one day, for example, a Robins Portable Floatex Shakeout completely knocked out the cores from nine huge castings. Only two men plus the crane operator were needed. It would require ten men—using pneumatic breakers, chisels and sledges—to match this performance.

What's more, this gruelling test was conducted on a *standard* Robins Portable Floatex Shakeout! The Floatex was not altered in any way. It was not strengthened in any part. It was not equipped with any special base or foundation.

That's not all! When the test was completed, not a trace of damage could be found—in springs, bearings, shaft, live frame . . . *anywhere*. Yet the Floatex had knocked out the cores from nine huge castings weighing from 12 to 17 tons each. And it had done so in as little as 17 seconds . . . no longer than 17 minutes!

No wonder the Robins Floatex Shakeout saves you time, money and headaches! Portable models are versatile enough to do both flask shakeout and core knockout *wherever* the work may be. In short, they save you the entire cost of an additional machine.

Floatex Shakeouts are mechanically versatile, too. Your own workmen can change the stroke as required. Thus, a Floatex which has been handling light-walled castings, for example, will handle much heavier ones just as effectively.

You can get Floatex Shakeouts in sizes to meet your particular needs —for 100-pound castings to flasks weighing 100 tons or more. Every size is genuinely full-floating. It shakes the flask, not the building.

Whether you want to do shakeout and knockout as consecutive operations, or shakeout at night and knockout during the day (when the machine would otherwise be idle) write to Robins.

Learn how both jobs can be done with *one* machine . . . by making only *one* single investment. Address Robins Conveyors Division, 270 Passaic Avenue, Passaic, N. J.

ROBINS

FLOATEX SHAKEOUT ®

ROBINS CONVEYORS DIVISION, HEWITT-ROBINS INCORPORATED

HR HEWITT-ROBINS INCORPORATED

ACTIVITIES OF FOUNDRY Groups

Minnesota

UNIVERSITY of Minnesota Student Chapter of the AFA was officially installed Apr. 8 at a dinner meeting at the Union on the university campus.

Preceding the dinner an inspection trip was made through the facilities of the foundry at the university. Professor Holtby gave a talk on the new mechanical - aeronautical building which is under construction and told of improvements to be made in the foundry.

The dinner meeting was opened by James Anderson, foundry instructor and faculty advisor for the student chapter, who gave a brief history of the original student chapter, which was the twenty-first chapter in the national organization and was disbanded during the war. He also told of placing former AFA student members in the casting industry.

Mr. Anderson introduced John Hermanson, student chapter chairman who acted as toastmaster and introduced the speakers.

Dean Teeter, head of the Institute of Technology, University of Minnesota, welcomed the chapter into the university and enumerated advantages of belonging to a technical society. Professor Rowley, head of the mechanical engineering department, told of the co-operation given to the student chapter and commented on the new mechanical engineering building.

Sheldon P. Pufahl, chairman, Twin City Chapter of the AFA, then spoke of the co-operation which will be given the student group by the Twin City Chapter, which is setting up a scholarship fund to help students at the university who are interested in foundry work.

William Maloney, national AFA secretary, spoke of the opportunities offered to students by the AFA and the opportunities for college graduates in the foundry industry. Mr. Maloney then presented Mr. Hermanson with the traditional cast iron rattle which officially installed the Minnesota Student Chapter in the national organization.

Also attending the meeting were: S. V. Wood, regent of the University of Minnesota and former national AFA president; H. H. Judson, AFA director; Carter DeLaittre, industrial advisor of the Twin City Chapter; Lillian K. Polzin, Twin City Chapter secretary, and Professor Potter, former foundry instructor.

Chairmen of other technical societies also were present including those of ASME, AIEE, ASCE, AICE, School of Mines and the Tech. Commission. There also were representatives from several Twin City foundries.

Student chapter officers are: John Hermanson, chairman; Mark Irwin, vice chairman; Harvey Sauby, secretary, and Ted Swanson, treasurer.—*Harvey Sauby.*

Northwestern Pennsylvania

TWO interesting meetings of Northwestern Pennsylvania Chapter of the AFA were held at the Moose Club Blue Room, Erie, Pa., Mar. 22 and Apr. 26. At the March meeting O. J. Myers, Werner G. Smith Co., Minneapolis, spoke on "Coreroom Ailments, Causes and Cures." Eighty foundrymen attended the meeting.

On Apr. 26 the speakers were M. T. MacPherson, foundry engineer, and J. W. Grennan, open hearth superintendent, Symington-Gould Corp., Depew, N. Y. Their subject was "Waste and How It Affects Costs in a Foundry." One hundred and ten members and guests were present.

Officer and director nominations for the 1948-49 season are: Chairman, Joseph Hornstein, Meadville Malleable Iron Co., Meadville, Pa.; Vice chairman, Joseph Shuffstall, National-Erie Corp., Erie; Secretary, R. J. Harding, Pickands Mather & Co., Erie; treasurer, Frank Volgstadt, Griswold Mfg. Corp., Erie.

(*Continued on page* 176)

M.I.T. STUDENT CHAPTER: Student chapter members of the American Foundrymen's Association at Massachusetts Institute of Technology, Cambridge, Mass., are shown at the installation ceremony held Mar. 2

FREE WORKING

- INCREASES PERMEABILITY
- DECREASES DRYING TIME

Foundry management, watching mounting costs, sees profits in MOGUL. This perfect Green Bond makes money because it decreases drying time, yields smooth cores and reduces discards. MOGUL works profitably with pitch or resin because cores can be handled warm. For both green and dry strength use MOGUL in cores.

CORN PRODUCTS SALES COMPANY
17 BATTERY PLACE • NEW YORK 4, N. Y.

COMBS GYRATORY FOUNDRY RIDDLES

Type "V" Illustrated above is $225.00 complete.

Type "CS" With Automatic Discharge $290.00.

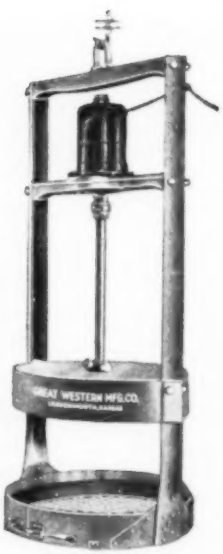
Type "HL" Laboratory Sifter for Sand Control.

These Machines were demonstrated at the American Foundrymen's Convention in Philadelphia.

All are available from your Foundry Supply House.

Full information will be sent on request.

IMMEDIATE SHIPMENT ON ALL TYPES



Type "CR" Complete—$280.00.

Great Western Manufacturing Company

LEAVENWORTH, KANSAS

(*Continued from page* 174)

Directors with term expiring in 1949 are: George Johnstone Jr., Johnstone Foundries Inc., Grove City, Pa.; J. Douglas James, Cooper-Bessemer Corp., Grove City, and John E. Gill, Lake Shore Pattern Works, Erie.

For term expiring in 1950: James J. Farina, American Sterilizer Co., Erie; Bailey D. Harrington, Hickman Williams & Co. Inc., and Fred Carlson, Weil-McLain Co., Erie.

For term expiring in 1951: Mark Morrison, U. S. Radiator Co., Dunkirk, N. Y.; Clyde Cooper, Keystone Brass Works, Erie; Harold Lolley, Bucyrus-Erie Co., Erie, and John Clarke, General Electric Co., Erie.—*Earl M. Strick, Erie Malleable Iron Co.*

Chesapeake

CHESAPEAKE Chapter of the AFA had as its guests members of the Baltimore chapter of American Society for Metals at the March meeting.

L. W. Eastwood, Battelle Memorial Institute, Columbus, O., spoke on gases dissolved in metals. He pointed out that there are two types of gas evolution, one caused by sharp drop in solubility for hydrogen and oxygen when metal changes from liquid to solid, and the second a result of formation of steam, carbon monoxide, sulphur dioxide, etc.

Mr. Eastwood said that only 0.000022 per cent hydrogen dissolved in molten metal can form 1 per cent voids during solidification. The reaction between hydrogen and oxygen to form steam does not take place in magnesium or aluminum alloys. Two types of porosity mentioned in the talk were pin hole or gas porosity and microporosity.—*Jack H. Schaum, National Bureau of Standards.*

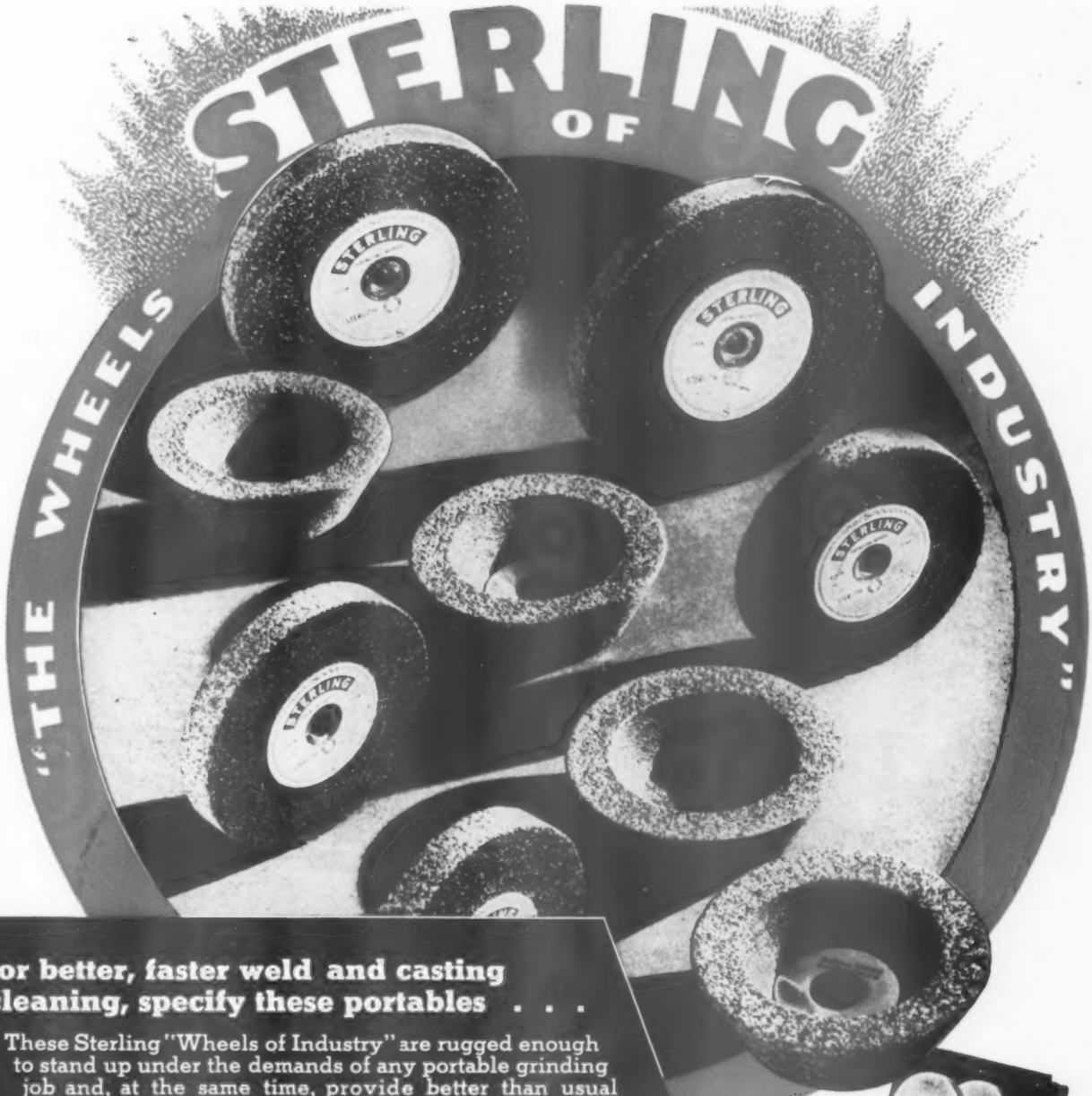
No. Illinois and So. Wisconsin

ROUND-TABLE discussions were held by Northern Illinois & Southern Wisconsin Chapter of the AFA at its meeting Mar. 9 at Faust Hotel, Rockford, Ill. Upton Bartlett, Alloy Castings Co., Rockford, led the nonferrous group; Clarence Dale, Burd Piston Ring Co., Rockford, the gray iron group and Ralph Lightcap, Rupp Pattern Co. Rockford, the patternmaking session.

At the pattern meeting the following subjects were discussed: Rigging coreboxes so that they can be blown in the coreblower or used on the bench. Replacing steel inserts with plastic inserts in coreblowing boxes. The European practice of lin-

(*Continued on page* 180)

STERLING OF INDUSTRY "THE WHEELS"



For better, faster weld and casting cleaning, specify these portables . . .

These Sterling "Wheels of Industry" are rugged enough to stand up under the demands of any portable grinding job and, at the same time, provide better than usual service. They are made for each individual job . . have the correct bond, grain, structure, shape, and size to handle easily and efficiently on castings, welds, and other rough surfaces.

A wide range of finishes is possible, depending upon the specification selected for your particular job. Sterling engineers, skilled by years of experience on all types of portable grinding, can suggest the wheel for your use.

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THE BUSHINGS—Round or oblong, held in place by simple lock washer and jam nut. Easy to install or replace. Note broad wearing surface of these hardened bushings in illustration at right. Made in two lengths—short for flasks and pattern plates up to ½" thick, and long for pattern plates ½" to 1" thick.

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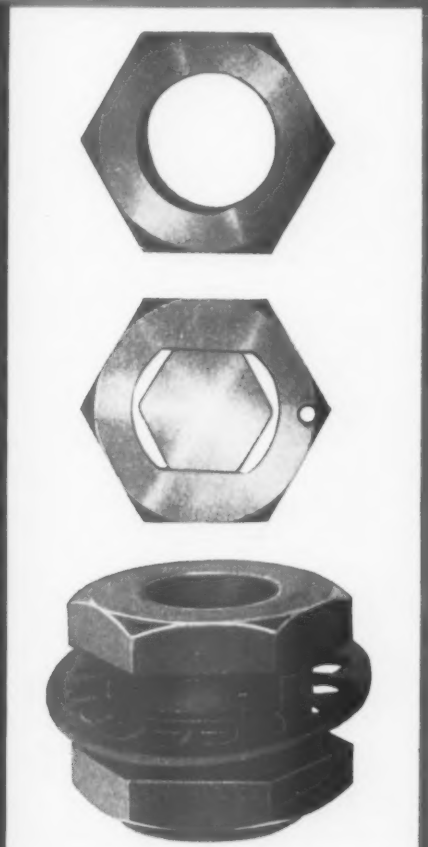

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Manufacturers of mold and core washes, facings, parting compounds, core paste, carbon-raiser.

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(*Continued from page* 176)

ing coreboxes with abrasive-resistant rubber and having a small sand ingate and no vents in the corebox. The advisability of a per-pound-basis in the manufacturing cost of matchplates. Coating wood coreboxes with red crankcase sealer in the event of converting a corebox to high production.

Those at the gray iron session discussed shrinks, which were defined as the normal reduction in volume of the cooling metal. Factors aggravating this reduction in volume by causing voids in the cooled metal are design, where thick and thin sections meet, and hot spots caused by oil in cores. Another cause of shrinkage was stated to be expansion of sand close to the gate. Pouring temperatures and lack of directional solidification were said to be contributing factors in causing shrinkage, as also is lack of ferrostatic pressure. Mexican and Texan pig iron were discussed and Texan iron was described as being soft and small, of high sulphur content and having a normal carbon pickup at 2750° F.

At the nonferrous session it was stated that aluminum is replacing cast iron chiefly where lightness is desired, and that by using aluminum, shipping and cleaning costs are reduced and in some cases breakage is lessened—*Carl L. Dahlquist, Green lee Bros. & Co.*

Tennessee

SECOND meeting of the Tennessee Chapter of the AFA was held Apr. 23 at the Patten Hotel, Chattanooga. Over a hundred members and guests attended the dinner and ensuing technical program, with Chairman G. Frank Anderson presiding. By-laws were submitted to the membership and accepted.

P. L. Arnold, U. S. Pipe & Foundry Co., and chairman of the nominating committee, announced the following nominations for officers and directors to serve the coming year: Chairman, G. Frank Anderson, Chattanooga Implement & Mfg. Co.; vice chairman, Charles Saunders, Tennessee Products & Chemical Corp.; secretary-treasurer, A. D. Willis, U. S. Pipe & Foundry Co., all of Chattanooga.

Directors nominated to serve for one year include: Lester Bealer, American Brake Shoe Co.; Paul Stuff, Ross-Meehan Foundries; Carter Paden, Moccasin Bushing Co., all of Chattanooga; and Ormand Corry,

(*Continued on page* 182)

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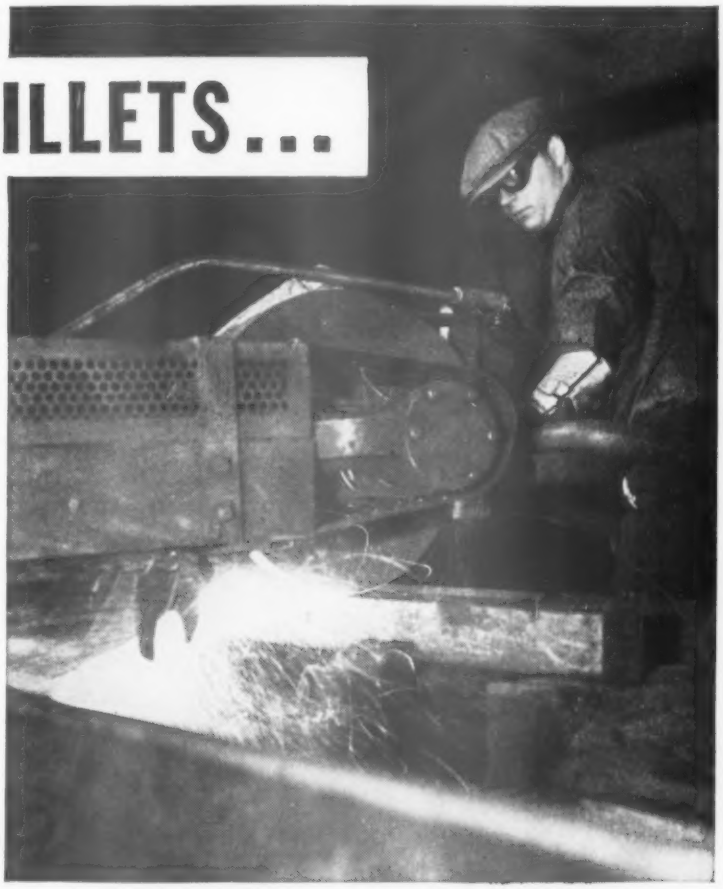

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Whether you require grinding wheels for a routine or unusual function, "U. S." engineers always go over your problem carefully.

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TO BITS

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(*Continued from page* 180)

Harrison-Corry Co., Knoxville. W. C. Cate, Crane Co., and William P. Delaney Sr., Eureka Foundry Co., of Chattanooga, were nominated for two years, and Karl Landgrebe Jr., The Wheland Co., and S. C. Northington, Combustion Engineering Co., of Chattanooga, for three years.

Following the business meeting, W. W. Levi, Lynchburg Foundry Co., Lynchburg, Va., gave an excellent talk on "Cupola Practice," effectually illustrated his address with slides. Mr. Levi discussed fundamentals affecting cupola operations, including height of coke bed, factors affecting total content, slagging procedures, etc. A spirited discussion followed the speaker's presentation.—*A. D. Willis, U. S. Pipe & Foundry Co.*

Canton

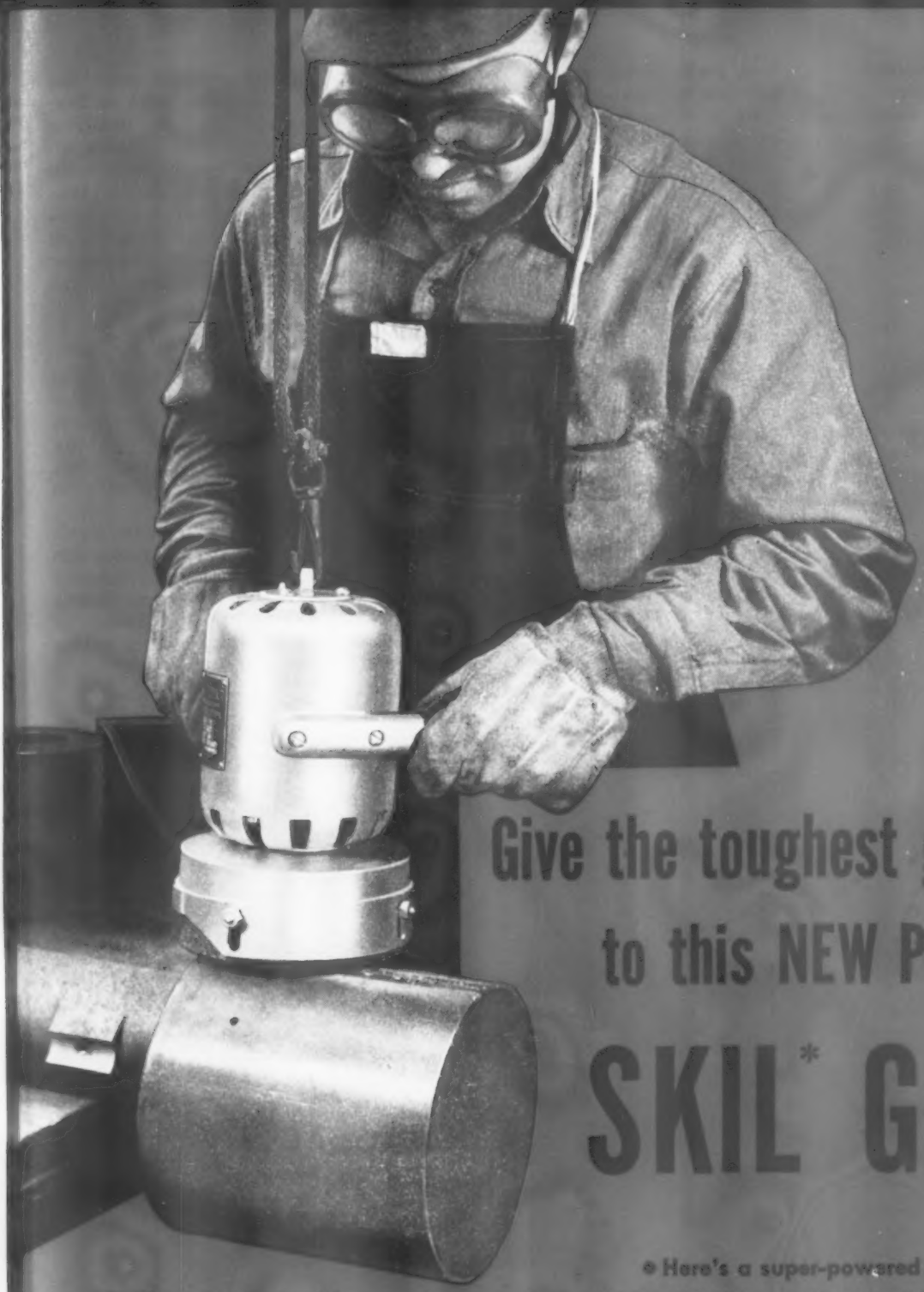
OVER 100 members and guests of Canton District Chapter of AFA attended National Officers' Night Apr. 8 at the Swiss Club, Canton, O. William B. Wallis, national AFA vice president, reported on activities of the national association.

Speaking on "Foundry Modernization," L. E. Everett, vice president, Lester B. Knight & Associates Inc., Chicago, told the audience that modernization of the foundry industry meant not only installation of new and modern equipment, but also proper organization of management, and control over its phases of manufacturing. He said that business organization is the greatest single factor in an efficiently operated plant. Slides showing modern equipment and charts illustrating typically modern plant organization aided the speaker's remarks.

Officers elected for the coming year are: Edward Taylor, F. E. Myers & Bros. Co., Ashland, O., chairman; George Biggert, United Engineering & Foundry Co., Canton, vice chairman; J. E. Fasig, F. E. Myers & Bros. Co., secretary, and Otis D. Clay, Tuscora Foundry Sand Co.,

(*Continued on page* 184)

EASTERN NEW YORK Chapter of the AFA at its meeting Apr. 20 heard talks by William Wallis, national AFA president-elect (at left), and W. B. George, R. Lavin & Sons, Chicago, (upper right). Speaker's table is shown at lower right. Left to right are: J. A. Wettergreen, General Electric Co., Schenectady, N. Y.; Mr. George; A. C. Andrew, American Locomotive Co., Schenectady; Robert L. Wickes (standing), E. F. Houghton & Co., Schenectady; Mr. Wallis; R. Garrison, Adirondack Foundries & Steel Inc., Watervliet, N. Y. and D. B. Slatter, General Electric Co., Schenectady. Photos by Lee Townley, Adirondack Foundries & Steel Inc.



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(*Continued from page* 182)

Canal Fulton, O., treasurer.

Directors are: F. K. Donaldson, Machined Steel Castings Co., Alliance, O.; Charles Raymond, Atlantic Foundry Co., Akron, O., and Robert Cairnie, Orrville Brass & Bronze Co., Orrville, O.

The chapter will hold its annual outing in August.—*Nils E. Moore, Wadsworth Testing Laboratory.*

New England

REGULAR monthly meeting of New England Foundrymen's Association was held at the Engineer's Club, Boston, Apr. 14, with more than 100 members and guests present.

James P. Moran, research engineer, Induction Heating Corp., Brooklyn, N. Y., addressed the group on "Dielectric Core Baking." Mr. Moran made cost comparisons on operating costs and sand mix, and outlined the rapid progress which has been made during the last year in this new corebaking method.

He went on to say that average small and medium sized cores are cured dielectrically in two or three minutes. Conveyor equipment used permits cores to be placed on a belt by the coremaker, pass through the heating electrodes and emerge at the opposite end of the tunnel ready for use. The process eliminates labor usually required to load and unload racks, and thus reduces core costs. Less space also is required. Another advantage stressed was the reduction in core mixes required.

Second portion of the program comprised a talk by Frank W. Curtis, development engineer, Induction Heating Corp., on "Hardening of Cast Iron by Induction Heat to Eliminate Chills."

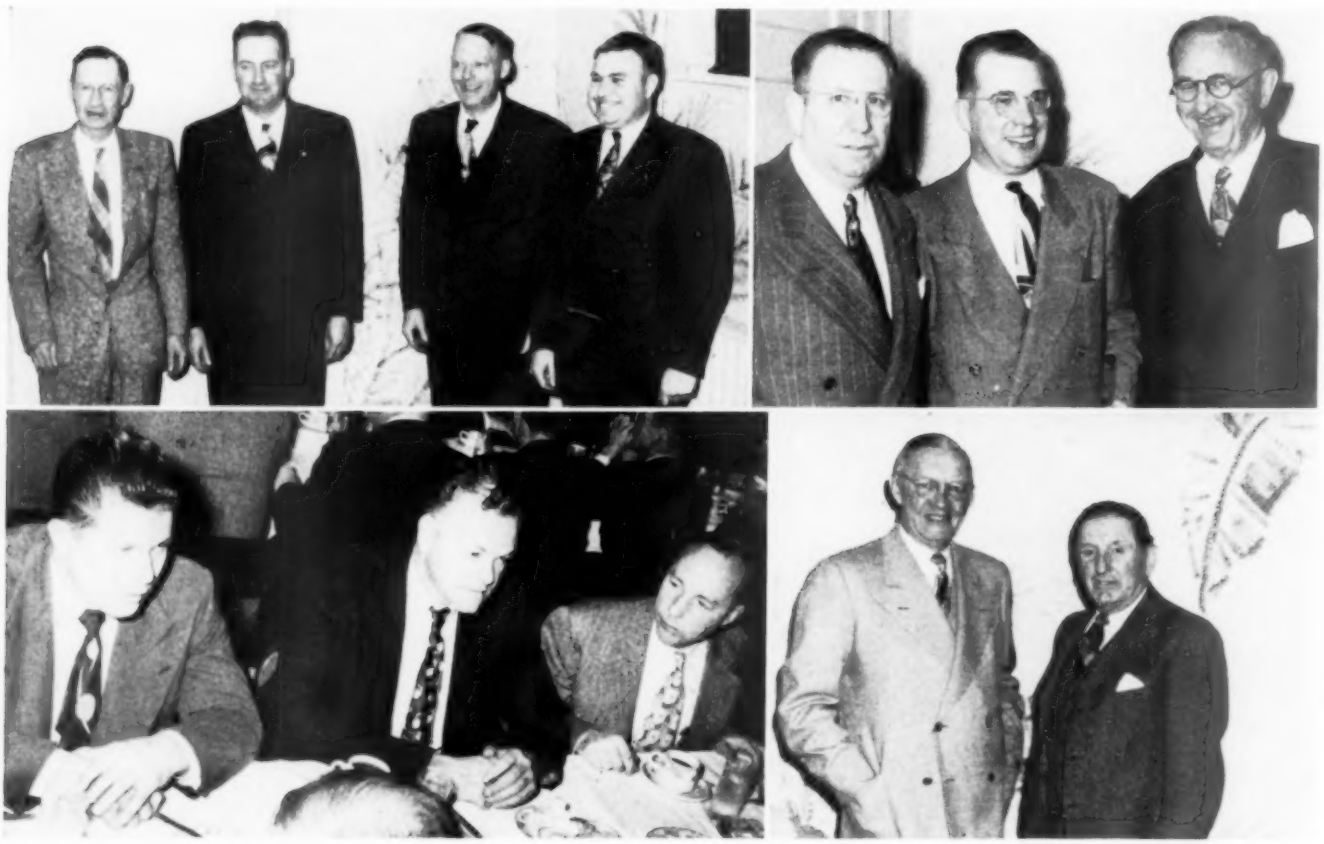
Mr. Curtis displayed several samples and outlined the process used in one plant, which hardens over two million pieces annually at a substantial saving over previous methods. More than 700 different parts are handled, and the equipment is flexible enough to handle relatively small runs of 25 or 50 pieces, although the usual run comprises 400 to 500 pieces. Simple copper tube coils and Transite fixtures are employed, and the heated parts are oil quenched, to provide a hardness of about 58 Rockwell C.—*Merton A. Hosmer, Hunt-Spiller Mfg. Corp.*

Rochester

PATTERNMAKERS' Night was celebrated Apr. 13 by Rochester Chapter of the AFA at Seneca Hotel, Rochester, N. Y. C. R. Simmons, Durez Plastic & Chemicals Inc., North Tonawanda, N. Y., spoke on "Plastic Patternmaking."

Mr. Simmons dealt with the liquid phenolic type of casting resins and demonstrated their use by actually casting two small patterns during his talk. Proper proportioning of plastic and accelerator, proper mixing

(*Continued on page* 186)



SOUTHERN CALIFORNIA: Views of some of the men who attended the March meeting of Southern California Chapter of the AFA are shown here. Upper left, left to right, are: E. O. Imus, city engineer, Oxnard, Calif.; Hugh Clark, building inspector, Oxnard; Ernest Winterholm, foundryman, and George Shannon, city manager, Oxnard. Upper right, left to right: Charles F. Sherer, vice president and general manager, Davenport Machine & Foundry Co., Davenport, Iowa, main speaker at the meeting; H. E. Russill, Eld Metal Co. Ltd., chapter president, and Harry E. Kunkel, chief inspector, Air Pollution Control District, Los Angeles County, coffee speaker. At lower left: Robert Hongola and Melvin Kunzman, General Electric Co., Los Angeles, and Roy E. Paine, Aluminum Co. of America, Los Angeles. At lower Right: Art Hageboeck, Frank Foundries Corp., Moline, Ill., and Robert Gregg, Reliance Regulator Co., Alhambra, Calif.

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for HEAT TREATING AND ANNEALING

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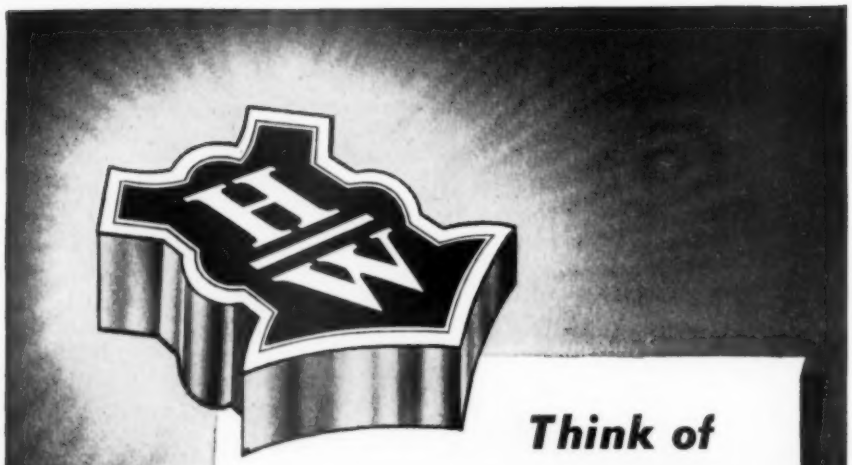

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(*Continued from page* 184)

and proper aging are the essentials of producing a good plastic reproduction. He went on to say that plaster, wood, metal or a flexible material are all suitable for forming the mold cavity for the plastic pattern.

He concluded by saying that ease of duplication, ease of changing and patching, and low cost make this plastic promising as a patternmaking material. A series of slides illustrating the use of the plastic casting resin was presented with the talk.—*G. M. Etherington, Gleason Works.*

Central Indiana

WILLIAM McFERRIN, metallurgical engineer, Electro-Metallurgical Co., Detroit, addressed the Central Indiana Chapter of the AFA Apr. 5 at the Athenaeum, Indianapolis. More than 130 members and guests heard the talk on "Grey Iron Casting Defects," which was illustrated with lantern slides.

J. P. Lentz, foundry metallurgist, International Harvester Co., Indianapolis, presided in the absence of Chairman William Ziegelmueller.

Nomination of officers for the annual election to be held at the next meeting were announced by the nominating committee chairman, Ray Fickenworth, C & G Foundry & Pattern Works, Indianapolis.—*W. K. Mitchell.*

Eastern Canada and Newfoundland

GATES and Risers to Make Sound Castings" was the subject discussed by H. C. Winte, Motor Castings Co., Milwaukee, at the Apr. 9 meeting of Eastern Canada & Newfoundland Chapter of the AFA at Mount Royal Hotel, Montreal.

Mr. Winte said that the underlying principle that holds true for producing sound castings is controlled progressive solidification, and he maintained that gating and risering and pouring of castings should be done in such a manner as to fulfill that principle. With the help of slides he demonstrated the proper and improper applications of the "shrinkbob" riser.

R. E. Cameron, nominating committee chairman, announced the following slate of incoming officers and directors: O. L. Voisard, Robert Mitchell Co. Ltd., chairman; James Newman, Newman Foundry Supply Ltd., vice chairman; J. G. Hunt, Dominion Engineering Works Ltd., secretary, and L. Guilmette Canadian Foundry Supply & Equipment Co., treasurer.

Director for one year is H. E.

(*Continued on page* 188)

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SCIENTIFICALLY DESIGNED. Foundry ventilation is basically a matter of *air movement*—powerful suction; strong exhaust. That's why you'll find Propellair Verti-Stacks on foundry roofs both old and new, wherever you go. Verti-Stacks are *strictly functional—conservatively rated—built to do a job.* Write today for all the facts. Ventilation specialists from coast to coast.

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(*Continued from page* 186)

Francis, Jenkins Bros. Ltd.; for three years are: A. J. Moore, Canadian Bronze Co., Ltd.; J. E. Roberge, Hardware & Woodenware Inc.; H. T. Doran, Whiting Corp. (Canada) Ltd.; Alex Watson, Canadian National Railways Foundry, and Lucien Beaudry, Warden King Ltd.—*H. E. Francis, Jenkins Bros. Ltd.*

Quad City

T R. GAUTHIER, Aluminum Co. of America, Pittsburgh, was guest speaker at the Apr. 19 meeting of Quad City Chapter of the AFA held at Fort Armstrong Hotel, Rock Island, Ill.

Mr. Gauthier presented a sound film, "This Is Aluminum," which described the mining, processing and uses of aluminum. He explained the three general methods of casting aluminum—sand casting, dry casting and permanent mold casting—and pointed out that there has been a decided increase in the production of aluminum permanent mold castings and a decrease in the use of sand castings within the last two years. He also described the uses of various alloy materials with aluminum.

The nominating committee proposed the following names for officers and directors for the 1948-49 fiscal year: Chairman, M. H. Liedtke, Farmall Works, International Harvester Co., Rock Island, Ill.; vice chairman, E. P. Closen, John Deere Planter Works, Moline, Ill.; secretary-treasurer, C. R. Marthens, Marthens Co., Moline.

Directors for three years: J. H. Nelson, Mississippi Foundry Corp., Rock Island; R. E. Wilke, Deere & Co., Moline, and C. S. Humphrey, C. S. Humphrey Co., Moline.

Directors for two years: W. C. Bell, Frank Foundries Corp., Moline; H. L. Mead, John Deere Harvester Works, East Moline, Ill., and H. A. Rasmussen, General Pattern Corp., Moline.

Directors for one year: R. H. Swartz, Riverside Foundry, Bettendorf, Iowa; A. D. Matheson, French & Hecht, Davenport, Iowa; A. H. Putnam, A. H. Putnam Co., Rock Island, and C. L. Briceland, J. I. Case Co., Bettendorf.

Board of trustees: R. E. Wilke, C. S. Humphrey and R. H. Swartz.—*C. R. Marthens, Marthens Co.*

CENTRAL NEW YORK Chapter of the AFA celebrated National Officers' Night Apr. 9 at Onondaga Hotel, Syracuse, N. Y. Thomas Curry, metallurgist, Lynchburg Foundry Co., Lynchburg, Va., was technical speaker

Tri-State

TRI-STATE Chapter of the AFA celebrated National Officers' Night Apr. 14 at Tulsa, Okla. Max Kuniansky, national AFA president, discussed operations and the personnel setup at Lynchburg Foundry Co., Lynchburg, Va., where he is vice president and general manager

Preceding the regular meeting, chapter officers and directors met with Mr. Kuniansky in the welfare assembly room, Bethlehem Supply Co., Tulsa. Mr. Kuniansky took a leading part in the discussion and pointed out the importance of a strong chapter technical program and stressed the importance and necessity for a good educational program.

Chapter officers and directors nominated for the coming year were announced by Chapter Secretary Clyde B. Fisher, Enardo Mfg. Co., Tulsa.—*F. E. Fogg, Acme Foundry & Machine Co.*

Wisconsin

WISCONSIN Chapter of the AFA held its regular monthly meeting Apr. 9 at Hotel Schroeder, Milwaukee, with 225 present. A few moments of silent prayer were held in memory of the chapter's treasurer, Richard Jordan, vice president, Sterling Wheelbarrow Co., Milwaukee, who died during the week.

Results of the election of new officers and directors were announced. All are from Milwaukee. Robert C. Woodward, Bucyrus-Erie Co., president; R. C. Haack, Wisconsin Gray Iron Foundry, vice president: Walter Edens, Badger Brass & Aluminum Foundry Co., secretary, and Clarence A. Gehrman, Sterling Wheelbarrow Co., acting treasurer until June 30, to replace Mr. Jordan who had been re-elected.

Directors to serve for three years are: John V. Olle, Motor Castings Co.; George Tisdale, Zenith Foundry Co. and Sylvester Mueller, Falk Corp., all of Milwaukee.

After dinner the meeting was divided into six groups to hear speakers on various subjects.

Gray iron: "Cupola Practice," by A. W. Gregg, Whiting Corp., Harvey, Ill.; malleable: "Continuous Melting with Batch Type Furnaces," by Jack Smith, Strohman Furnace & Engineering Co., Chicago; pattern: "Pattern-Foundry Relationships," with L.

(*Continued on page* 190)

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You help yourself and you help your supplier when you plan and place your orders on sands well in advance of needs. Possibilities of being caught short by transportation snags and other unforeseen events are thus eliminated. It should be entirely unnecessary for you to gamble with the chance of being confronted with empty bins. Insist on a routine of anticipating needs well ahead . . . MAKE YOUR KNOWLEDGE OF SCHEDULED SAND USAGE SERVE AS A VALUABLE FORM OF INSURANCE.

BE SURE OF YOUR SOURCE

Industrial Silica enjoys a long-standing reputation for faithfulness to desired quality and grade on every shipment. Definite delivery advantages are also available from the four Industrial Silica plants in the heart of the foundry industry. Here are some of the sands regularly furnished: sands graded to meet your specifications for heavy, medium and light steel castings; natrual, unwashed sands for heavy steel castings; runners, ladle lining and general blast furnace use; for all types of gray irons and malleable, steel and aluminum cores; for acid furnace bottoms and for all types of blasting.

We anticipate a heavy demand for sands to be used in the making of magnesium and aluminum castings. Therefore, we solicit your inquiries as soon as possible.

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(*Continued from page* 188)

F. Tucker and H. K. Swanson, national AFA pattern group, leading the discussion; nonferrous: Discussion led by William B. George, R. Lavin & Sons Co.; steel: "Technique of Magnaflux Inspection," by W. E. Thomas, Magnaflux Corp., Chicago; technical: "Engineered Cores and Core Binders for the Steel Foundry," by Harold Ziebell, Crucible Steel Corp., Milwaukee.—*John E. Hubel.*

Central Michigan

CENTRAL Michigan Chapter of the AFA met in the Hotel Schuler at Marshall, Mich. on Apr. 20. V. J. Sedlon, president of the Master Pattern Co., Cleveland, spoke on "The Factors in Selecting Pattern Equipment."

Mr. Sedlon directed his talk principally to foundrymen and buyers of patterns and castings. He pointed out that a pattern should fit the job in that the materials and workmanship should be in line with the number of castings desired and the design of the casting. As an example, the speaker mentioned that a soft wood pattern is usually satisfactory where the design is simple and the number of castings desired is small. On the other hand, where the design is complex and the number of castings desired is large, it is usually best to make hard wood or metal patterns.

Mr. Sedlon advised the buyer of patterns to consult with the pattern shop and foundry to make sure that there is agreement as to the way the job should be made. Mr. Sedlon concluded his lecture by showing slides of typical modern pattern equipment and the steps necessary to complete a complicated pattern and core box arrangement.—*C. C. Sigerfoos, Michigan State College.*

Central Illinois

CENTRAL Illinois Chapter of the AFA met Apr. 5 at Jefferson Hotel, Peoria, Ill., in celebration of National Officers' Night. W. B. Wallis, national AFA vice president, and J. E. Kolb, national director, were present. Mr. Wallis spoke briefly on the growth and future plans of the AFA.

L. L. Clark, assistant foundry metallurgist, Buick Motor Division, General Motors Corp., Flint, Mich., was the technical speaker and described the methods of cupola charging used at the Buick plant. He stressed the importance of control, placing it as one of the most important parts of good foundry operation.

(*Continued on page* 192)

HEAVY DUTY *MOLDING MACHINES*

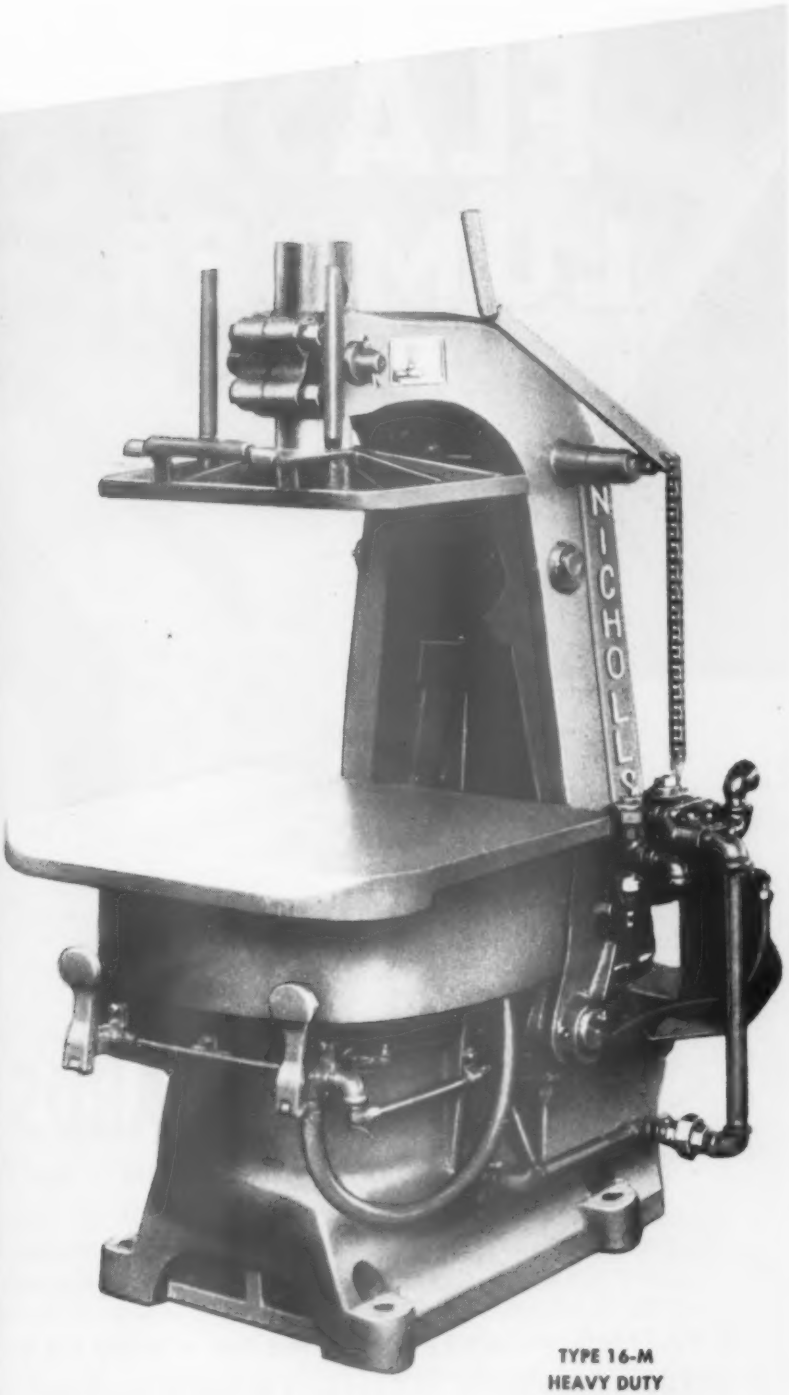
JOLT-SQUEEZE FOR JOBBING AND PRODUCTION WORK

This Type 16-M Heavy Duty Jolt-Squeezer was designed especially for rugged foundry service. A compact, sturdy machine of simple construction insures successful operation; gives a hard solid jolt.

This machine is provided with an interlocking means which insures the head being in squeezing position before the squeeze valve can be operated. The squeeze head is operated to and from the squeezing position with ease.

The base and squeeze cylinder is a heavy, one-piece semi-steel casting. All pins and bushings are case hardened and ground to size. This machine requires a minimum of floor space.

Descriptive leaflets, giving specifications and dimensions of this, and many other Jolt-Squeeze and Pattern Draw machines, sent upon request.



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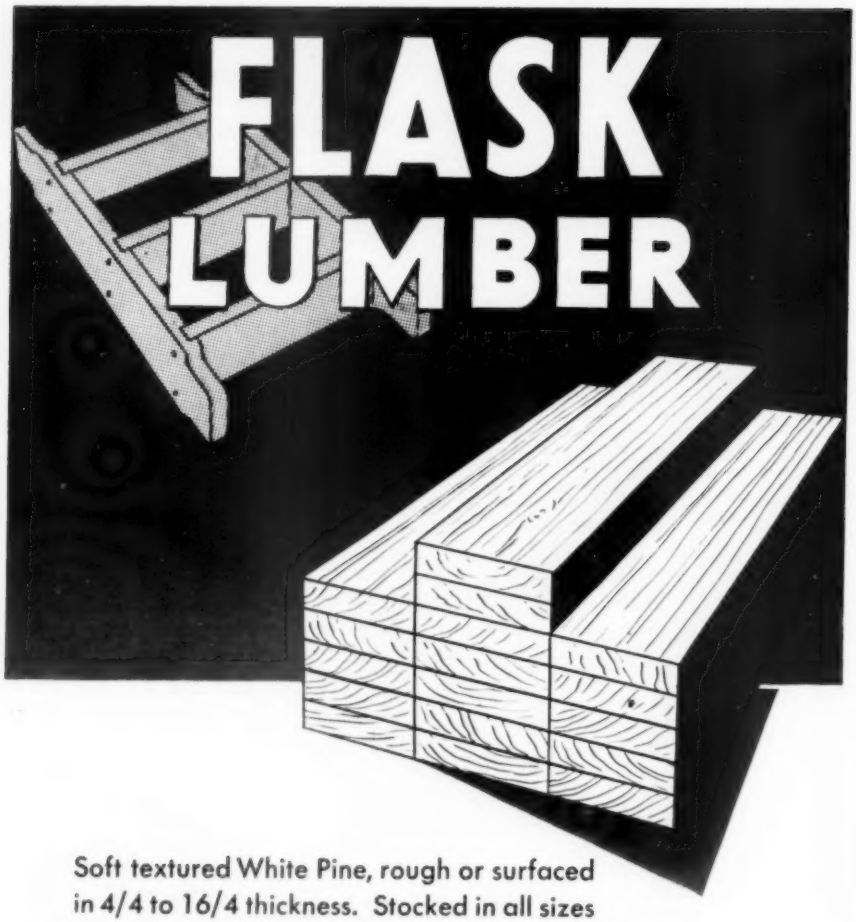

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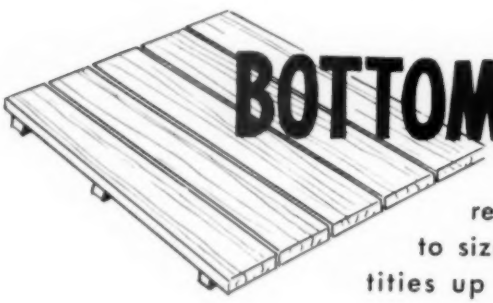

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PITTSBURGH, PA.

DIAMOND 1200

WILLOW RANCH, CALIF.
LAKEVIEW, OREGON

(*Continued from page* 190)

He explained the use of a pure graphite block for use with a dry sand core for obtaining chill test specimens. This method is said to give a truer picture of the inoculants necessary than was possible with a water-cooled cast iron block.

Ed Roby, Peoria Malleable Castings Co., Peoria, gave the nominating committee report for elective officers for the coming year. They are: F. W. Shipley, Caterpillar Tractor Co., Peoria, chairman; Charles Bucklar Jr., Superior Foundry Co., East Peoria, Ill., vice chairman; Vern W. Swango, Caterpillar Tractor Co., Peoria, secretary-treasurer; E. J. Burns, Illini Foundry Co., Peoria, and C. B. Soper, American Foundry Co., Bloomington, Ill., three year directors.

The chapter's annual clambake is planned for June 12 at Keeneland Park, Peoria. — *Vern W. Swango, Caterpillar Tractor Co.*

Chicago

FOR its regular monthly meeting on Apr. 5, the Chicago Chapter of the AFA presented the nationally prominent industrialist, Charles R. Hook, president, American Rolling Mill Co., now the Armco Steel Corp., Middletown, O., as guest speaker. An audience of more than 250 at the Chicago Bar Association heard Mr. Hook present his inspiring views on his favorite theme of "Taking the Mystery out of Business."

The speaker pointed out that by making available high-quality goods in tremendous quantities at low prices American industry has given the highest standard of living in the world; furthermore, the United States is the only major nation today whose productive abilities are sufficiently strong to provide for the needs of its people.

"If production is such a great force for social progress, why is there so much confusion and strife in American industry," Mr. Hook asked. His answer, arrived at after more than 45 years' experience in the steel business both as a worker and an executive, is that the majority of industrial disputes arise because of lack of understanding of the simple economics of business.

"Taking the mystery out of business" should have first call on management's time and brains, the speaker emphasized, and by management he referred to the management team —foremen, superintendents, works managers and all the rest. Most American workmen are fair minded and seek understanding. If given the

(*Continued on page* 194)

Quality Control in the foundry a job for PYROLANCE!

Quick, accurate temperature readings of molten metal are reason enough why so many non-ferrous foundry operators depend on the Alnor Pyrolance! The protected thermocouple, with adjustable angle head, is mounted in the lance tip—takes temperatures below the surface, unaffected by dross or other conditions. And the rugged pyrometer movement gives accurate readings—quickly, of course. A well-balanced, easily handled instrument you'll like from the first time you try it.

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(*Continued from page* 192)

facts, honestly and sincerely, they will respond.

Research in employee opinion has revealed the startling fact that the lines of communication between the front office and the shop are not in good repair, Mr. Hook continued. "Too many men in too many plants do not understand that their well-being depends in the long run upon sustained, high level production. Too few realize that the business which does not earn a fair profit cannot possibly provide continuity of employment, safe and comfortable working conditions and other desirable benefits. Far too many do not realize that wages, dividends and profits all come from production. There is no other source. What has not been produced, cannot be divided."

The speaker gave numerous simple but effective illustrations to explain the economics of business, explanations which should be given to workers. Among these illustrations were several concerning the fallacy of raising wages to increase purchasing power. Purchasing power of the industrial worker is simply an exchange of time, and there are encouraging signs that American workmen are becoming more interested in what the wage dollars will buy than in wage rates alone.

If the men at the machine really understood the economics of business, industrial misunderstanding and strife would virtually cease to exist, Mr. Hook declared. "The mission of management is ever to create conditions that make possible the smooth efficient operation of the industrial machine. Lack of economic understanding constitutes the most serious challenge to management today. If the day arrives when men and management universally can understand and agree upon fundamental economic principle, our country would embark upon a period of sustained progress and prosperity beyond our fondest dreams."

Presiding at the meeting was Chapter President Fred B. Skeates, foundry superintendent, Link-Belt Co., Chicago. During the business portion of the meeting, he read the report of the nominating committee submitting candidates for 1948-49 chapter officers. Nominations were as follows:

President, Chester K. Faunt, works manager, Christensen & Olsen Foundry Co., Chicago.; vice president, W. D. McMillan, works metallurgist, McCormick Works, International Harvester Co., Chicago; secretary to succeed himself, V. M. Rowell, sales technician, Velsicol Corp., Chicago; and directors, A. W. Gregg, executive engineer, Equipment Division, Whiting Corp., Harvey, Ill.; Martin Rintz, foundry superintendent, Continental Foundry & Machine Co., East Chicago, Ind.; Roy Frazier, foundry consultant, Love Bros. Inc., Aurora, Ill.; and Retiring President F. B. Skeates.—*Erle F. Ross.*

Michiana

FINAL meeting of the season was held by Michiana Chapter of the AFA Apr. 6 at Spaulding Hotel, Michigan City, Ind. The Michigan City members of the chapter acted as hosts and provided entertainment in the form of motion pictures which were presented following the dinner.

Newly elected oficers and directors were introduced. They are: K. A. Nelson, Chicago Hardware Foundry Co., Elkart, Ind., chairman and John Rush, Elkhart Brass Mfg. Co., Elkhart, vice chairman. Directors with terms expiring in 1951 are: John P. Jordan, Ed S. Wegenke, A. E. Peterson and H. A. Dunphy.

John Rassenfoos, research engi-

(*Continued on page* 196)

TEXAS Chapter of the AFA held a one-day conference Apr. 16 at Lufkin. Among the participants were: Left—left to right: J. H. Smith, Central Foundry Division, General Motors Corp., Saginaw, Mich., one of the speakers; Col. Cal C. Chambers, Texas Foundries Inc., Lufkin, and Max Kuniansky, national AFA president. Below—Officers, directors and guests at the management luncheon

Redford

CORE BLOWER CARTRIDGE TYPE

A few of the thousands of cores that are made daily on Redford Core Blowers.

• PROVEN •

Hundreds of foundries are using Redfords as an efficient low cost means of producing small cores. The high percentage of reorders we receive proves that Redfords are profitable to own.

• SIMPLICITY •

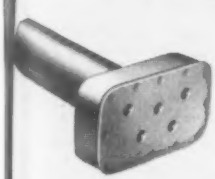
The Redford reduces core blowing to its simplest form. Anyone can understand—operate and maintain it.

• SPEED •

All the work of handling core box and driers is done on the machine. Cartridges can be quickly loaded by hand. As many as 200 boxes are being blown and drawn by one operator in one hour.

• FLEXIBILITY •

With a Redford you can make any number of different cores without loss of time for changeovers. Here is what a large jobbing foundry has to say: "We are using 7 Redfords. Your development of the portable cartridge which can be made a part of the core box equipment, has given us all the advantages of core blowing without loss of flexibility so essential to us."



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Lectromelt furnaces allow you to melt one iron or steel analysis, tap as much as you need, then alter the analysis to the requirements of the next order—using the same bath of molten metal to fill as many orders as furnace capacity allows. This flexibility makes handling small orders profitable and quick. *Write today for complete details.*

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(*Continued from page* 194)

neer, American Steel Foundries, East Chicago, Ind., presented an interesting and educational discourse on "Fundamentals of Sand Behavior." His presentation included many slides which showed comparative data of many tests made to determine control, quality and results. The actions of bentonite clay, silica flour and many other ingredients used in the preparation of sand were explained in detail.

He stressed the importance of proper sand control, moisture content and strength in order to obtain consistent results in the production of castings.—*S. F. Krzeszewski, American Wheelabrator & Equipment Corp.*

Metropolitan

APR. 5 MEETING of the Metropolitan Chapter of the AFA was held at Essex House, Newark, N. J., and was the final meeting of the year, the May meeting being canceled because of the national convention. Kenneth A. DeLonge, chairman presided at the business meeting and presented his report of the year's activities.

A unanimous vote was cast for selections of the nominating committee to serve as officers and directors of the chapter for the year 1948-49. Officers include: Chairman, John A. Bukowski, Worthington Pump & Machinery Corp., Harrison, N. J.; vice chairman, Thomas J. Wood, American Brake Shoe Co., New York; secretary, J. F. Bauer, Hickman, Williams & Co., New York; and treasurer, Dan Polderman Jr., Whiting Corp., New York.

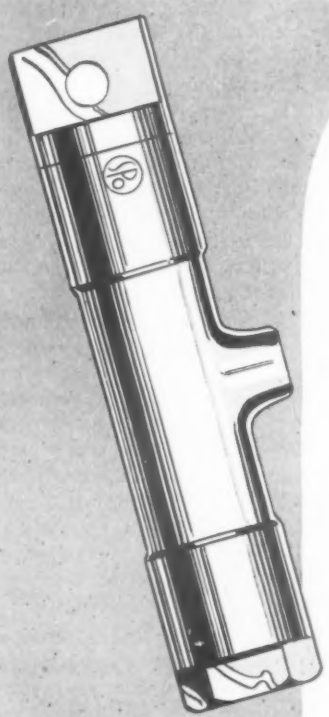
Directors named to serve for a term of two years are as follows: Frank B. Eliason, Pennsylvania Foundry Supply & Sand Co., Philadelphia; Ernest R. Miller, Bethlehem Steel Corp., Bethlehem, Pa.; John Van Haver, Worthington Pump & Machinery Corp., Harrison, N. J.; Robert C. Pitz, Pitz Foundry, Brooklyn, N. Y.; and Aubrey E. Winsted, Moore Brothers Co., Elizabeth, N. J.

G. W. Talbot, Cooper Alloy Foundry Co., Hillside, N. J., acted as technical chairman and introduced the speaker, C. R. Simmons, Durez Plastics & Chemicals Inc., North Tonawanda, N. Y., who discussed the accelerated phenolic resin type of pattern making material. Actual use of the material was demonstrated with precautions emphasized in its use. These included proper coating and lubrication of the master molds used in production of patterns. Advantages

(*Continued on page* 198)

"Never Again!

UNDEPENDABLE VIBRATORS ARE TOO EXPENSIVE!"



It doesn't pay to use them—"that's for sure." And you don't need much experience to conclude that it doesn't pay to repair them, either.

What you put into them is a certain quantity. What you get out of them is an uncertain quantity. It's a poor gamble, with the odds all the wrong way.

"Let your maintenance man or molders fix them?" Ever try it? You'll soon decide that their time is too valuable to spend on this losing venture. Even if subsequent satisfactory service were assured, the investment wouldn't pay.

Oh, yes, we *might* clean an old vibrator or replace a spring. Even so, we've decided it's better to let the "old timers" accumulate and then bundle them off to the *factory to be reconditioned or thrown away. Otherwise, out they go!

*SPO vibrators can be factory-reconditioned

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per Hour —

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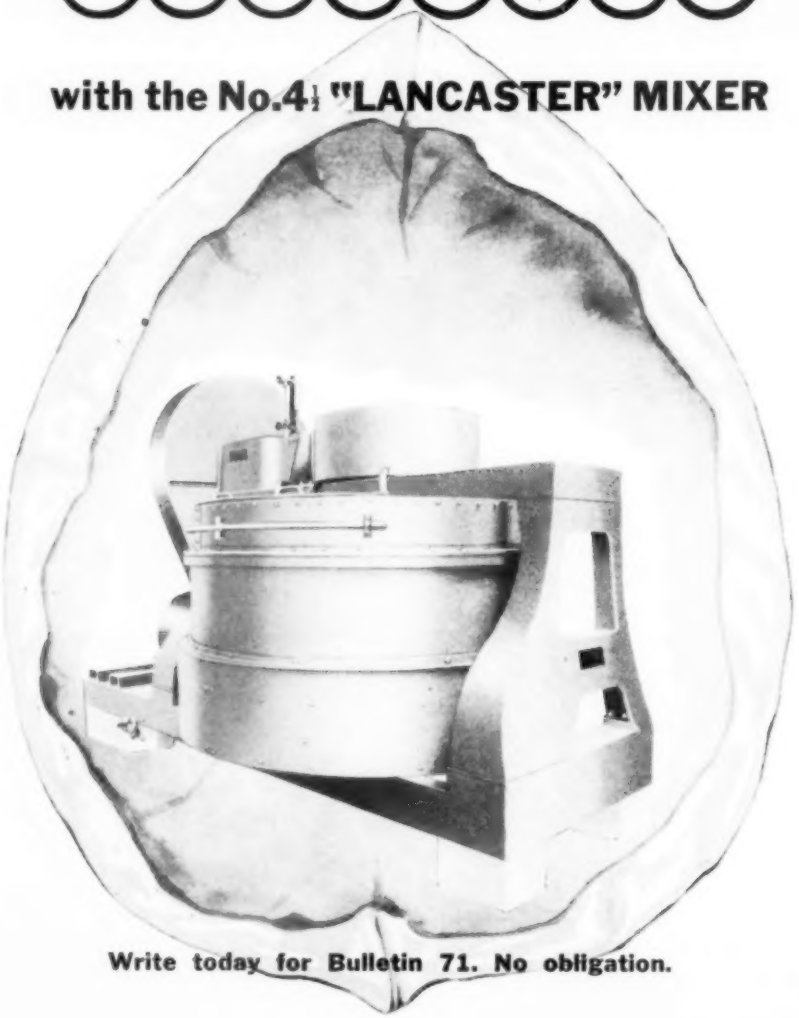

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BRICK MACHINERY DIVISION
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(*Continued from page* 196)

of this type of material are as follows: Low shrinkage, adaptation to experimental usage and small production runs, easy duplication of old equipment, production of difficult patterns, and quick volume production.

Following the talk, Franz Schumacher, Cooper Alloy Foundry Co., Hillside, N. J., demonstrated methods used at his plant in making plastic patterns and inserting them in matchplates. George Ledermann, of Ledermann & Bessler, spoke briefly on "Rigging for Core Blowing," describing proper design of core boxes for orifice location and adequate venting so that air volume can be dissipated rapidly.—*W. H. Ferguson, Electro Metallurgical Sales Corp.*

Birmingham

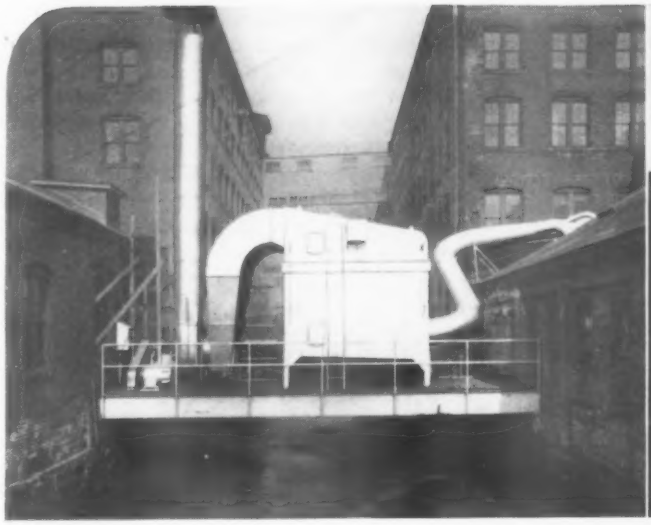
AN interesting discussion on the subject "More Profits to Foundries through Cost Control and Wage Incentives" was presented by Arthur A. Clay, Lima, O., at the Apr. 23 regular meeting of the Birmingham District Chapter of the AFA.

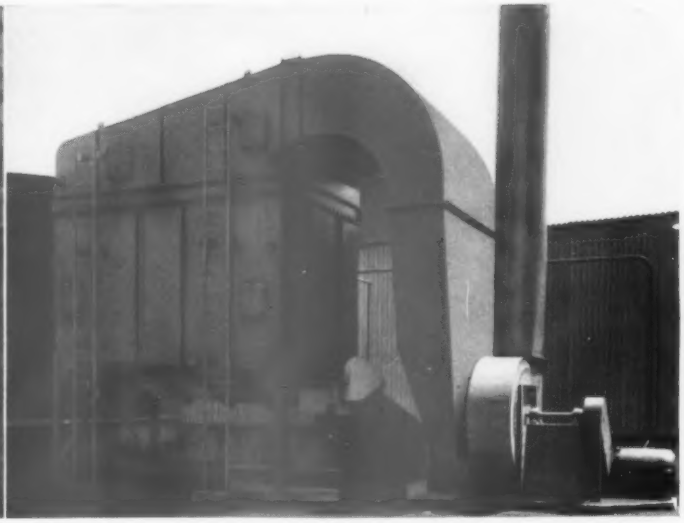
Mr. Clay was an interesting speaker and thoroughly informed on his subject through years of experience. According to Mr. Clay, foundries are built and operated primarily for three reasons: To make profits; to manufacture good castings; to provide employement.

To be successful in the foundry business as in any other business, sound cost control is essential if one is to make a profit. Where different classes of work are manufactured, too many concerns figure sales price on average cost per ton. Naturally then the less difficult work is priced at a higher price than a competitior may ask for the same class of goods where a definite production cost control system is in operation.

It naturally follows that cost based on a time study system is more accurate than the old piece-work price based on supervisors' judgment and past production records. Just because a molder has produced fifty molds per day for a period of time is no indication he cannot produce more molds per day. Time and motion standards bring to light the extra cost that is being included, such as down time waiting for this and that. Time values must be guaranteed to the worker and he must be paid for all waiting time beyond his control. Thus the division in actual cost of producing the molds and the cost of waiting time can be analyzed and the cause of excess cost can be eliminated.

(*Concluded on page* 200)





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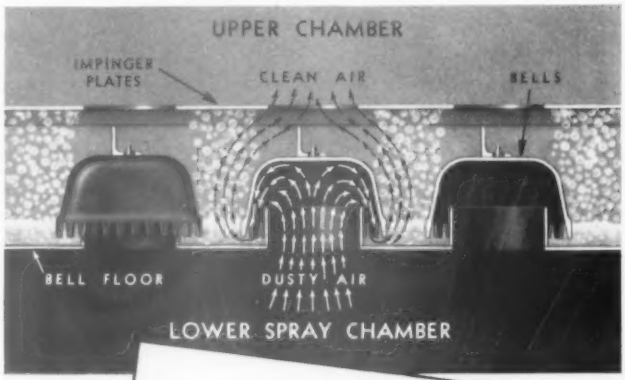
Improve Foundry Working Conditions and Increase Foundry Profits



● Bell-Spray Wet Dust Collectors meet every requirement of practical day-to-day foundry operation. They clean up the foundry air—make foundries more desirable places in which to work—attract a higher grade of workmen—reducing absenteeism, and labor turnover, resulting in more efficient, more profitable operation.

Dust laden air is drawn into the water spray or receiving chamber and thoroughly wetted, settling out the larger dust particles. The air then passes up through 3 inches of water on the bell floor—see diagram above—is thoroughly cleaned, and is drawn through moisture eliminator plates to the fan, which consequently handles only washed, clean air.

Furnished in three different designs.—Wide range of standard sizes.—Installed as individual units or complete with collecting hoods.
Let us work with you on your requirements!

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1. Inexpensive to Operate.
2. Minimum of Maintenance.
3. Highly Efficient.
4. Handles Both Wet and Dry Air.
5. Safe for Hot Gases.
6. Easy Sludge Disposal.
7. Inside or Outside Location.
8. Sturdy, Serviceable Construction.
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10. Wide Range of Standard Sizes.

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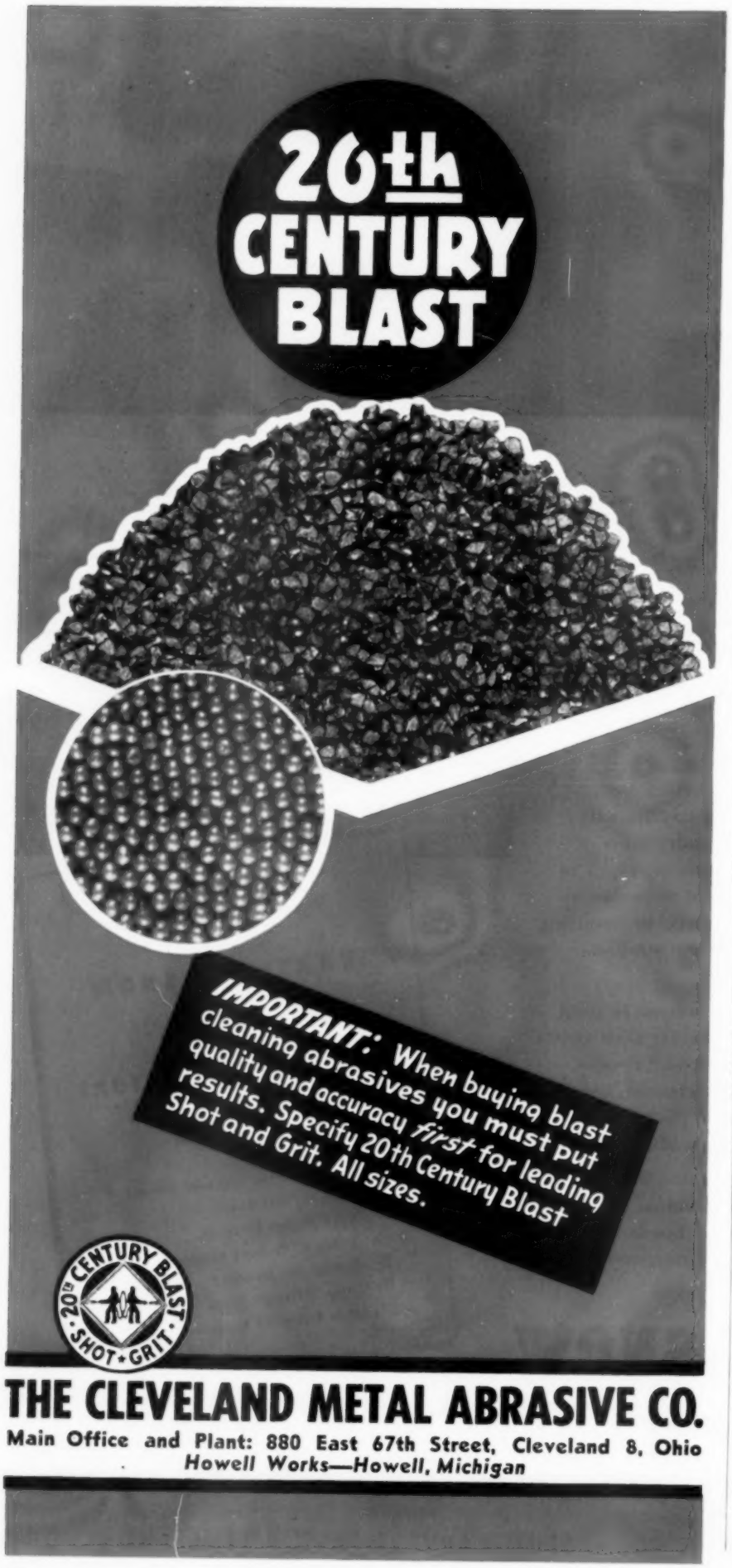
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Howell Works—Howell, Michigan

(*Concluded from page* 198)

Group methods of payment should be eliminated as far as possible. Even in the jobbing shop it is possible and practicable to establish time standards for standard elements. A planning committee could quickly compute additional cost beyond the standard elements on all new jobs as they come in.

About ninety members and guests were present at the meeting.—*J. P. McClendon, Stockham Pipe Fittings Co.*

Twin City

MEMBERS of Twin City Chapter of the AFA had E. V. Blackmun, chief works metallurgist, Aluminum Co., of America, Cleveland, as their guest speaker Apr. 1.

Mr. Blackmun started his speech by describing a "phantom foundry" of the not-too-distant future. Metal is being melted and poured, castings are being made and knocked out without a person in sight. A huge panel board sparkling with red, green, yellow and white lights directs the castings along a maze of monorail conveyor tracks at the mere pushing of buttons and closing of switches by one individual.

The production of any foundry depends upon three major factors, according to the speaker. They are: Equipment, material and workmanship. He spoke at some length about the control of foundry materials.

He said that aluminum must be handled differently than other metals, primarily because of two factors—hydrogen absorption and affinity for oxygen. Hydrogen absorption causes porosity and may be reduced through diligent melting practices.

Wasted metal caused by oxidation is indicated by the dross produced, and Mr. Blackmun said that most dross is caused by too many metal transfers. He went on to say that aluminum foundries are tending towards synthetic molding sands having high green strength and adequate flowability, and which permit permeabilities in excess of 30 to be used without sacrificing casting finish.—*O. J. Myers, Werner G. Smith Co.*

Reading

APPROXIMATELY 100 members and guests of Reading Foundrymen's Association heard Harry H. Kessler, Sorbo-Mat Process Engineers, St. Louis, discuss "Gating and Risering Iron Castings" at a meeting Apr. 20. Mr. Kessler diagnosed problems in casting manufacture and emphasized his talk with diagrams drawn on a blackboard.—*W. I. Cassidy.*

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of the valuable reference book that belongs in every foundry . . . North American Smelting Company's

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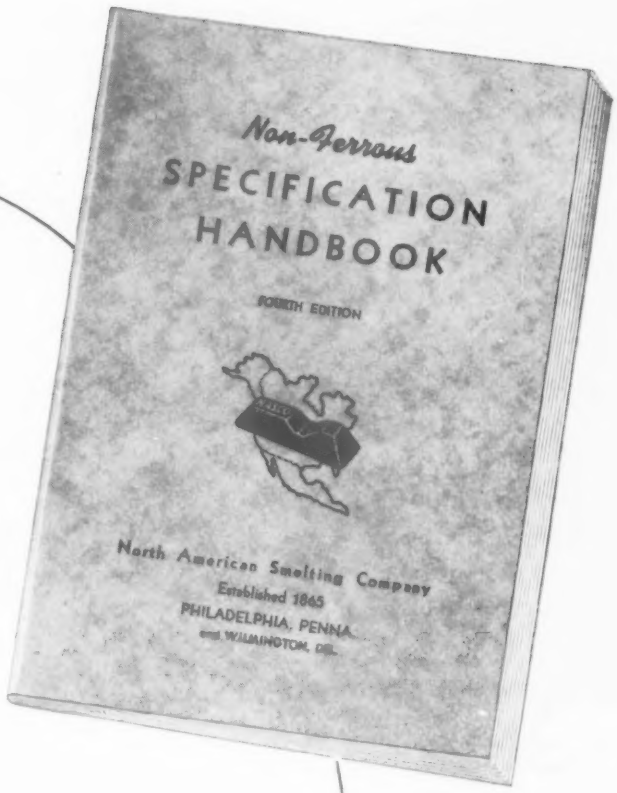
SPECIFICATION HANDBOOK

Free!



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Among the subjects covered in this new Handbook are Chemical and Physical Properties of Typical Brass Alloys . . . Navy, Federal, S.A.E., and A.S.T.M. Specifications for Alloys and Castings of Aluminum, Brass, Bronze, and Copper . . . Physical Properties and Test Bars . . . Weights of Castings. Included in this edition, *for the first time*, is a convenient price chart for ingot metals, easy to keep up-to-date.

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Man-to-Man

ON THE MOLDER'S BENCH

"Tremendous Trifles"

By RALPH L. LEE

THERE are foundries and foundries, and I should know, for I sure have been through plenty. But even so, I went through still another a short time ago I don't believe I'll forget for a long long time. This foundry was making good money for years through fat times and lean. From what I saw I'd say it will keep on making money for years to come.

Knowing something of the history and the batting average of this outfit before I went through, I had my eye peeled for some out-of-this-world stunts to write home about, but I didn't find any. In fact, I didn't see one single piece of equipment I hadn't seen many times before. Flasks were standard, roller conveyors mine-run, sand and sand handling just about like other peoples. They certainly did not have a rich uncle or a monopoly on any particular field. The truth of the matter is that their principal bread and butter product was just about as ordinary and unromantic as you will find anywhere.

But here! I am talking about what I did not find. This is what I did find. Believe it or not the interior of the foundry was painted sort of an apple green leaning slightly toward the yellow, and you could read a newspaper any place in it. The air was clean and I don't mean pretty clean. The floor was clean too, even close up around the machines—in the shakeout and even in the melting room.

The aisles were open, every one of them. I didn't see one misplaced molding board. They had an experimental molder working right along side and in line with the production molders, and I wouldn't have known it if I hadn't been told, for his work spot was as shipshape as all the rest.

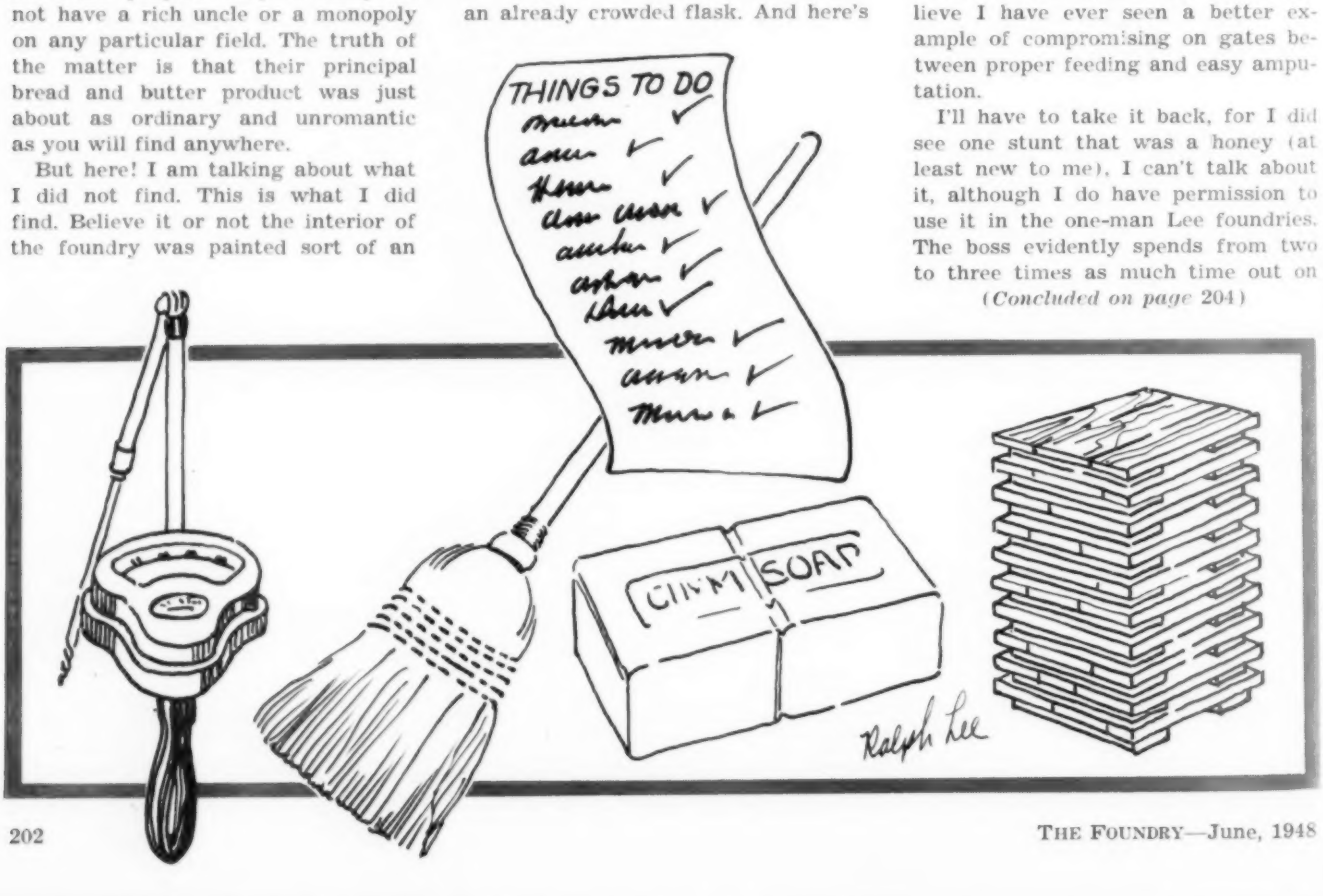
The molds were filled with something besides sand. In fact, some jigsaw-puzzle champion must have sat up nights figuring out how to tuck in three or four extra cavities in an already crowded flask. And here's another thing—they had only two sizes of flasks. The boss said they had all they could do learning how to use these two to the best possible advantage without messing around with all the other sizes.

"But," I said, "what about when one of your best customers asks you to do an off standard job for him—what about that, humgh?" "I help him get hold of someone else," he said. "We simply will not mix our drinks."

Another thing I learned — while they crowded their flasks with profit-producing products they did it in such a manner that they could zip off the castings from the gates slick as a whistle and in nothing flat. They had their snagging and cleaning down to a science, too. By the way, I don't believe I have ever seen a better example of compromising on gates between proper feeding and easy amputation.

I'll have to take it back, for I did see one stunt that was a honey (at least new to me), I can't talk about it, although I do have permission to use it in the one-man Lee foundries. The boss evidently spends from two to three times as much time out on

(*Concluded on page* 204)



ANNOUNCING

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37,000 to 42,000 tensile, 13.0% to 15.0% elongation, as cast, results with a new aluminum-magnesium alloy, requiring no heat treatment or aging. Has highest shock resistance, machinability and corrosion resistance of any aluminum alloy. *Replaces malleable iron at one-third the weight and with greatly decreased machining costs.* **—Bulletin 35-F**

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JOBBINS 4-8 SUPREME ... An improved aluminum alloy for permanent molding.

A faster casting cycle in permanent molds accompanies freedom from hot-shortness and shrinkage in a new aluminum-copper-silicon composition. Castings have superior pressure tightness and soundness. Physical properties are superior as-cast and can be heat-treated to the highest of any chill-cast aluminum. *High foundry economy and wide customer application result from these properties.* **—Bulletin 48-F**

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(*Concluded from page* 202)

the job as he does in his office.

It strikes me that if I don't look out I'll be accused of laying it on a bit thick, sort of gilding the old lily, so to speak. I certainly don't want to do this, for there is no need for it. The reason I'm so hopped up on what I saw is that there was not one single good thing that can't be used, as is, in the smallest pee-wee foundry, even in one as small as the one I operate.

I meet a lot of foundry folks wishing they could do this and do that if they only had the money, and others who coast along waiting for that happy day when their ship is scheduled to come in. When it does come in they say they are going to town, revamp the old place so you wouldn't know it and make everything hunky-dory and super-duper.

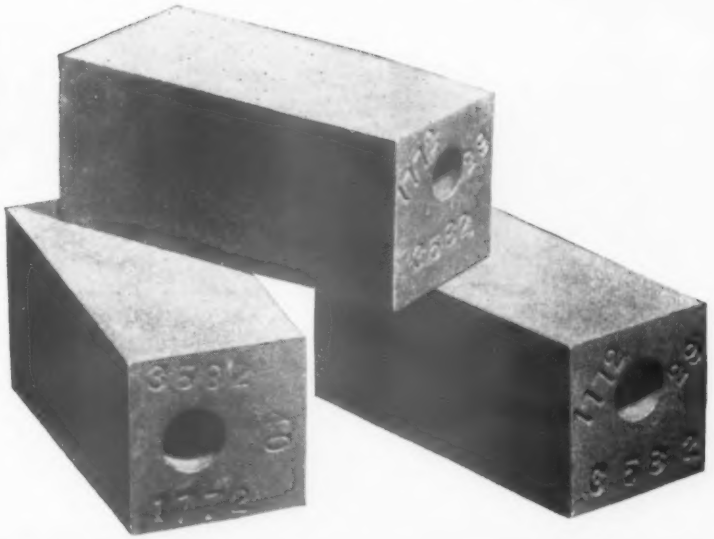
One Job Follows Another

I was scheduled to leave the evening following my visit through this foundry but the boss was such a real HE fine sort of a duck I stayed on till the next day. "You know, Ralph," he said that evening over a cup of the old stuff, "every once in a while folks ask us how we keep so much work ahead and running so steadily year in and out. I have to tell them," he went on, "we don't have any particular business-getting plans or programs that we are conscious of. But I do know this, every time we take the job we've already got to do and particularly one with a lot of mean bugs in it and we lick that job to a frazzle, clean on up to the point where all the loose ends are all tucked in, by golly, another good job is sure to show up. And that's the way it's been going for years."

Shortly after this visit I met a young foundry manager who was asking me what I thought of the plans he had for revamping his place when his ship came in. Remembering my visit I told him that as far as I could see he was on the right track. But, I suggested that in the meantime he might start a campaign cleaning up a lot of the loose ends he and I both knew were dangling about tripping up his people now and then. I even went so far as to hint that after he did this he might be surprised to find that he wouldn't care very much if the old ship never did come in.

No sir, the older I get and the more I see as I run about, the less spectacular real and lasting success seems to be. Maybe you can't make a silk purse out of a sow's ear, but a lot of seeming *trifles* all done up brown sometimes produce *tremendous* results.

DEPENDABLE SLAG HOLE BLOCKS



Slag hole block failures during a continuous-pour cupola run cease to be a problem with CARBOFRAX silicon carbide blocks on the job.

Retention of uniform hole size is assured by the dense slag-resistant CARBOFRAX blocks. Even with the blast on, rapid cutting away of this opening is avoided successfully. For runs of 18 to 24 hours duration, the slag stream stays almost constant. Troublesome, expensive shutdowns necessary for slag hole block replacement are eliminated.

In many plants, CARBOFRAX blocks are constantly proving their dependable durability. You, too, may profit by their use. Complete information, including stock sizes and dimensions of blocks for which moulds are available, can be obtained promptly by writing direct to Department B-68, The Carborundum Company, Refractories Division, Perth Amboy, New Jersey.

CARBOFRAX Slag Hole Blocks

BY **CARBORUNDUM**

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THE ADVENTURES OF *Bill*

By PAT DWYER

Drawings by RICHEY

THE last day of the recent convention," Bill said, "I was complaining to Shorty Monahan that I was so stuffed with special information of one kind and another, I doubted my ability to carry it home or digest it. Shorty, good old Shorty, came to the rescue. He gave me a clipping from his old home town paper. He claimed that the dope (Shorty at times is rather blunt) I had been listening to all week was deep stuff, prepared by men who knew all about their subjects. 'This here now clipping,' he said, 'was written by a man who knew nothing about his subject and therefore will serve as a catalyst, or inoculator or laxative or something. Give it a look once.' The clipping was headed 'You Should See the New Foundry.' "

Tuesday of this week the publisher of the Crooked Elbow Exponent, in company with J. W. Highhat, President of the Crooked Elbow Chamber of Commerce, visited the foundry located west of the city.

"Very prim, precise and accurate on ground with which he is familiar," Bill commented. "Modestly refers to himself merely as publisher of the Exponent, but gives his companion the full title President of the Chamber of Commerce. He does not waste time beating about the bush in a long harangue about how he tried to get out of the assignment, but presumably had to submit when J. W. came around in a brand new, bright red Flicker (Adv.) and practically kidnapped him for the afternoon. He does not mention the sunshine and shadow playing among the fence rails or sifting softly among the trees, all duly itemized with the scientific names picked out of the encyclopedia in the town library. All that kind of stuff is trimmed out and boiled down to the simple statement 'We visited the foundry located west of the city.' No person going to trip him up on that."

"I hate to interrupt you," I said, "but I can't help asking one question. Did they arrive at the foundry before the bottom dropped?"

"A very good question indeed. So good in fact that if we were not alone I should suspect prompting from a confederate. If you will be kind enough to pay attention, instead of trying to think up goofy questions you will learn that they not only arrived, but they saw things, never before seen by regular employes in a foundry. Listen my boy to what he said. Very probably it will knock you daid. Just a bit of poesy lad, thrown in free."

This was the first time in our life that we had ever been inside a foundry. We were very curious and full of questions when we arrived for our visit. Elmer (Bud) Topsail, half owner of the firm met us at the door and took us through the foundry. While there the employes were pouring forms for the making of burners for the Ever Ready Stove Works, at Gazinka. It was very interesting to see the sand molds placed in neat rows along the floor of the plant, ready for the hot metal which would mold the burners when enough molds were ready.

"Up to this point," Bill said, "he was not so far off the reservation. Then he explains how the metal is melted, transported and poured. Maybe the man saw what he thought he saw. The process and equipment differ to a considerable extent from that laid down in the *Cupola Handbook* compiled by a crew of experts and issued under the aegis of the American Foundrymen's Association."

The coke fire under a large metal pot would be touched off and a blast of cool air would bring up the temperature under the pot until the metal was ready to be poured. A large ladle was being cooked with fire clay so that the metal would not cool until all of it had been poured. From the large ladle, two men would use a much smaller ladle to pour the molten iron into the sand molds and make burners for floor furnaces. When the metal had cooled the sand would be brushed away and the finished product then would be inspected for any defects.

All of the men employed by this firm are skilled laborers and know the fine art of molding with hot metal. All of these men have had years of experience in this field of endeavor, and most of them are residents of the city. Buddy Topsail is always on his toes. While we were there he received several long distance calls from dealers who had junk metal for sale. He made a deal with each. He said that he did this so that there would always be enough in reserve as at times scrap metal becomes very short.

If you have not yet paid this industry a visit, it would pay you to take a little time off from your place

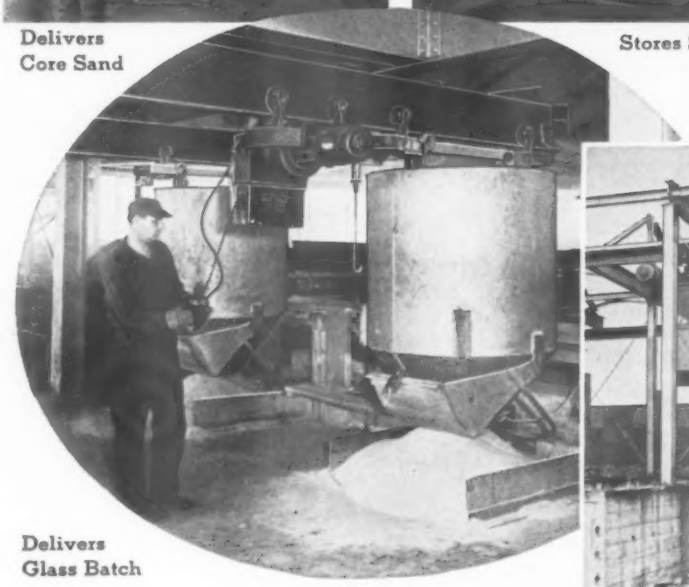
(*Continued on page* 209)

After floundering around for 347 pages, author lets cat out of bag. Reader spotted feline about page 10

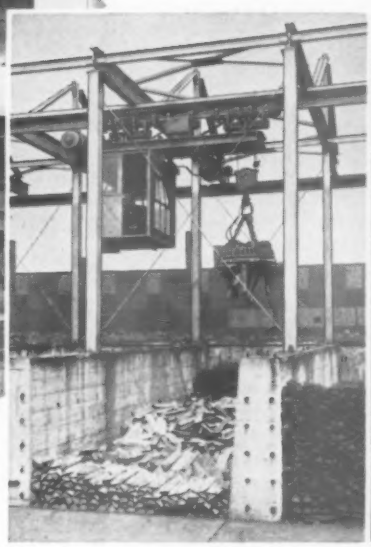
Delivers
Core Sand

Stores Sheet Steel

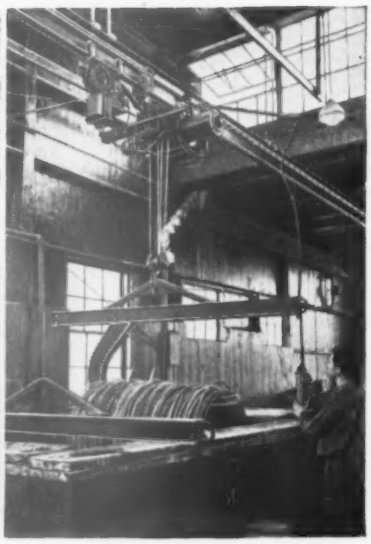
MONOTRACTORS Do the Hard Jobs



Delivers
Glass Batch



Stores Pig Iron



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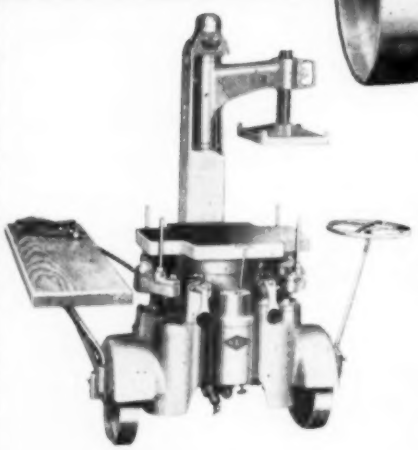
Model 10JY
in jolting position



Model 10JY
in strip position

Gives you what you need

1. SWING ARM
   gives complete accessibility to table
2. SCREW ADJUSTMENT
   makes possible quick change
3. ELECTRICALLY CONTROLLED PUSH BUTTON SQUEEZE
   increases efficiency of operation
4. AUTOMATIC LUBRICATOR
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8. SQUEEZE PRESSURE REGULATOR
9. POSITION PIN-LIFT PATTERN DRAW
10. STURDY, STREAMLINED CONSTRUCTION

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DAVENPORT MACHINE AND *Foundry Company*
DAVENPORT, IOWA U.S.A.

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(*Continued from page* 206)

of business and see just what is being done right here at your front door.

"Reminds me," I said of a passage in one of Kenneth Robert's historical novels. The hero refers with gratifying admiration and filial respect to his father. Starting out on his first voyage in command of one of his father's ships, the father warned him to be very sure he saw what he looked at, a rock, a cloud formation, a lee shore or a woman's face."

"That may be all very fine," Bill admitted, "where you actually see an object. What gets me down is where I am asked for an opinion on something I do not see. Listen to this letter from a firm which has been making chaplets for years and years, away back to the time when every molder made his own, or had the blacksmith knock him out a few with a flat head, and a sharp point at the other end to be driven into the bottom board."

Recently we supplied a customer with some small double-head chaplets to be used on pressure tight castings. The iron did not grip the stem closely and the castings leaked. The chaplets were used on cope and drag, and the leaks developed on the drag side. These chaplets had a 1/8-in. diameter stem, 1/2-in. high, with small round heads. In a former instance a set of chaplets with 3/8-in. diameter stems and square heads had served satisfactorily. We shall greatly appreciate any ray of light you may be able to throw on this particular problem.

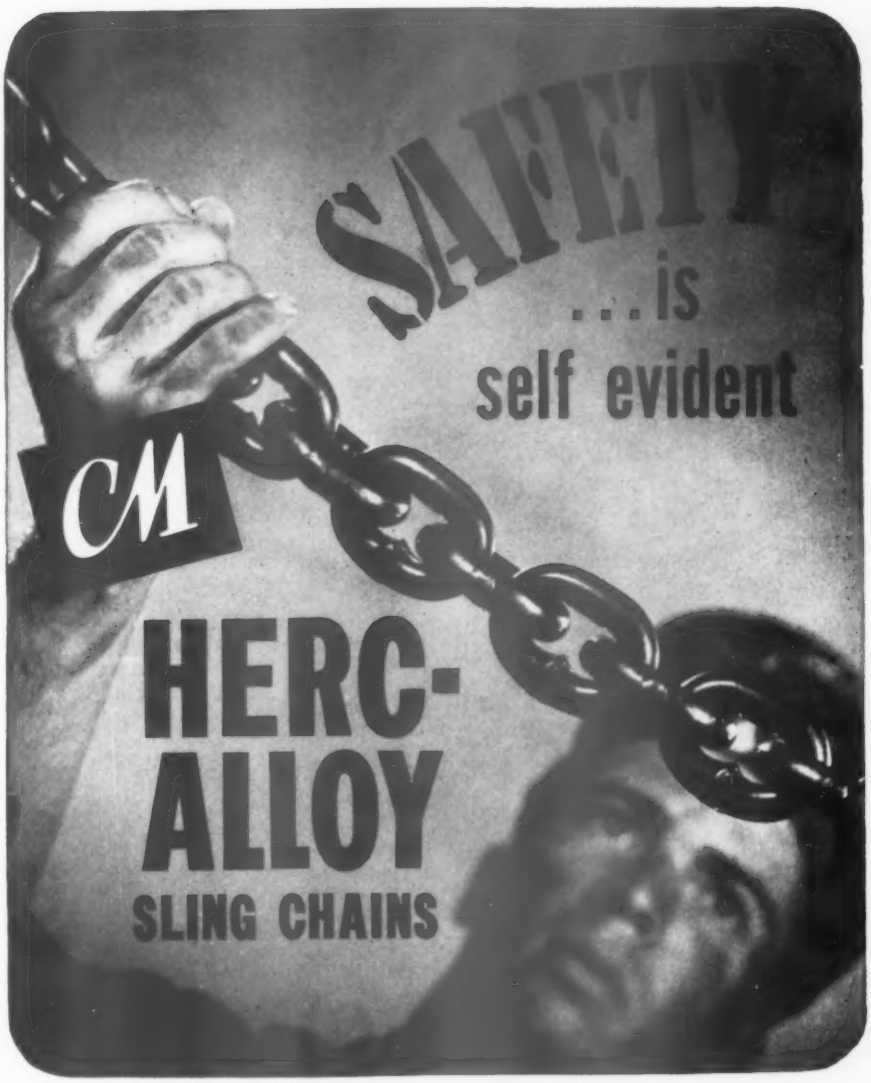
"The letter was accompanied by a small freehand sketch of a box-like casting 12 x 18-in. and 15-in. high with small x marking the position of each of the five chaplets on the cope side. A note indicated that the number and distribution of the chaplets was the same on the drag side. The chaplets are standard type, low carbon steel coated with an alloy of tin and lead. Weight of the casting with 1/2-in. thick walls was 150 lb."

"A very pretty little problem, indeed," I admitted. "I trust you had the answer up your sleeve."

"No," Bill said, "I did not have the answer up my sleeve, and I did not have it concealed in a high silk hat. I mulled over it for quite a while before I wrote the inquirer as follows:

To a certain extent your recent inquiry reminds me of the quandary of the man from Scotland Yard called in to solve the mysterious murder of Sir Reginald Gobblygook-Ashton in the morning room of his palatial and ancient abode Diddley-Comb-Diddymus in the Dell, near Cheesecake Village, Pygmalionshire, locally abbreviated

(*Continued on page* 213)



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- America's *first* alloy steel sling chain... first to bear a serial number.
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HERC-ALLOY... the chain you can *SEE* is safe

● A simple visual inspection* is all that is needed to determine the continued serviceability of a HERC-ALLOY Chain. That's why more and more of the important companies are standardizing on HERC-ALLOY... because HERC-ALLOY Chains are immune to unseen dangerous crystallization... because you can see when a HERC-ALLOY Chain needs repairs or replacing.

*Write for your copy of this new, informative booklet. No charge.

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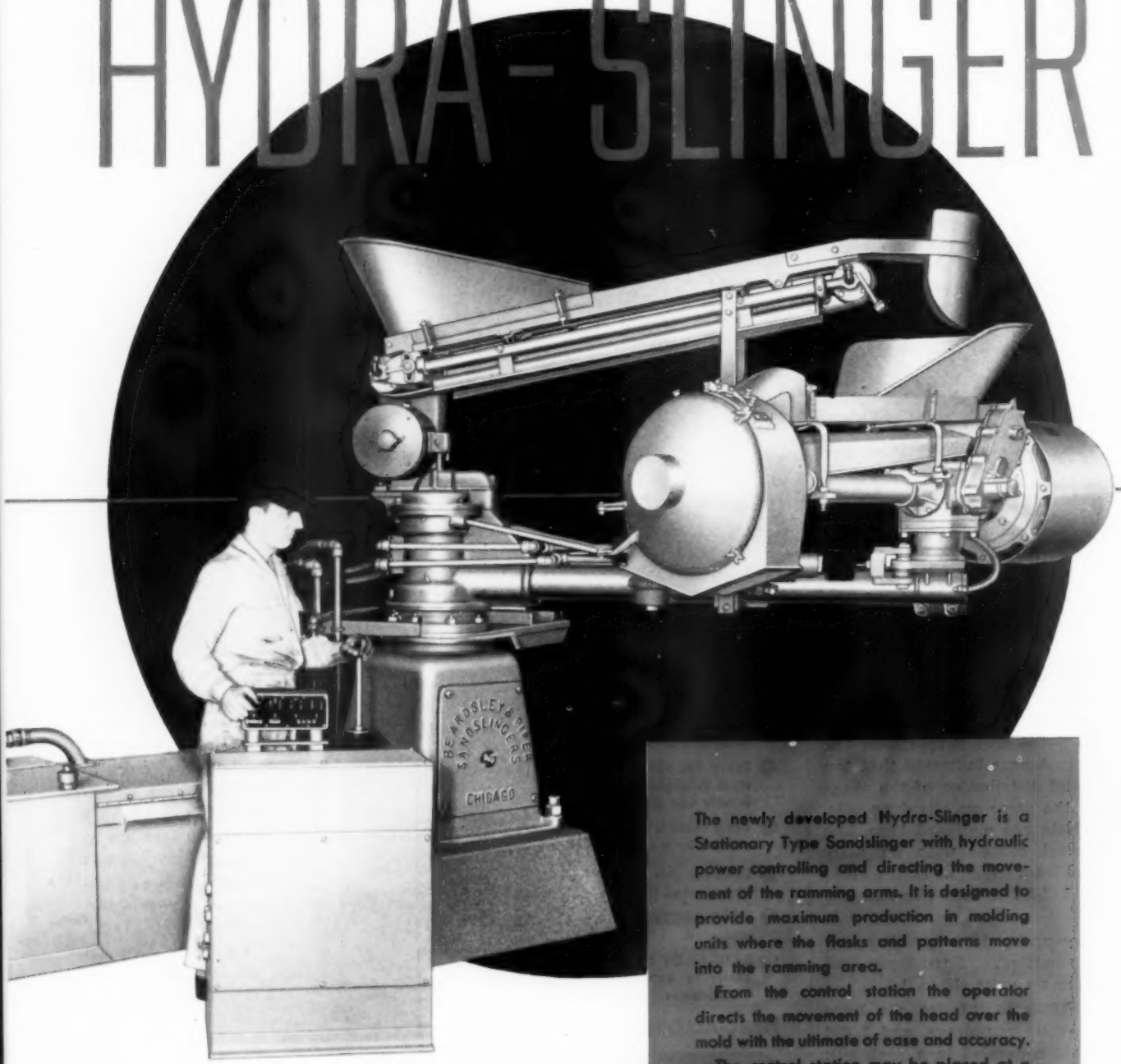
IT'S NEW... THE B&P

HYDRA-SLINGER



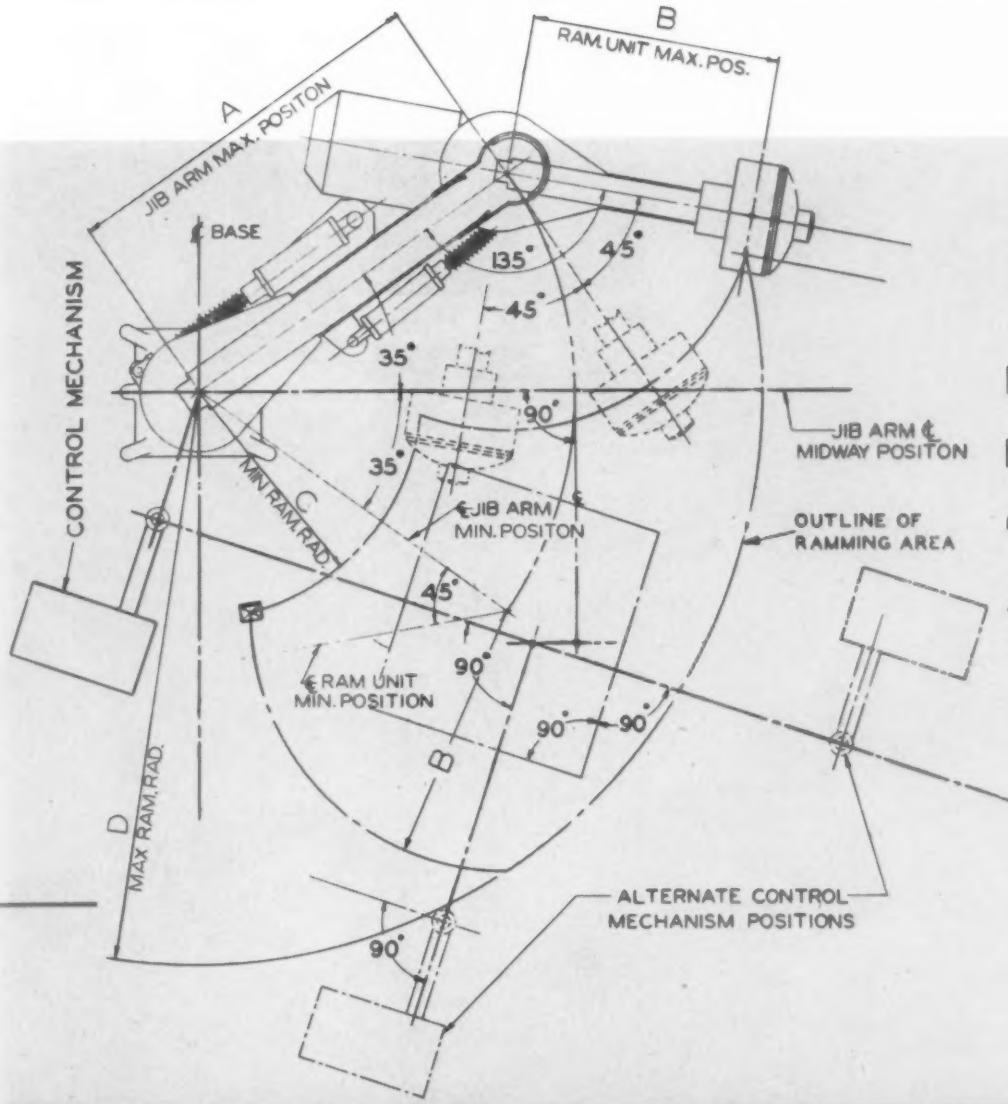
The newly developed Hydra-Slinger is a Stationary Type Sandslinger with hydraulic power controlling and directing the movement of the ramming arms. It is designed to provide maximum production in molding units where the flasks and patterns move into the ramming area.

From the control station the operator directs the movement of the head over the mold with the ultimate of ease and accuracy.

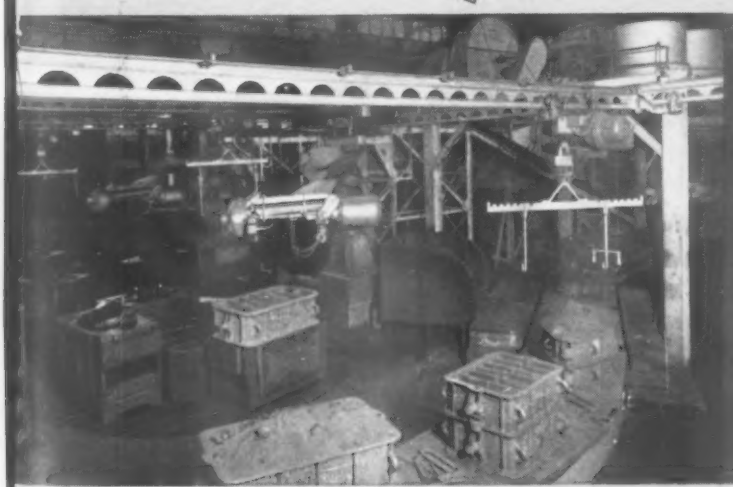
The control station may be placed at a choice of locations adjacent to the ramming area and may be at floor level or elevated to provide the most desirable visibility for the particular installation.

Various arm lengths provide a choice of ramming ranges.

FOR FAST, UNIFORM RAMMING



PLAN SHOWING RELATIONSHIP OF CONTROL MECHANIS AND RAMMING ARE



An excellent application for the Hydra-Slinger . . . a double Sand slinger and Turntable unit making molds for large tractor casting The Hydra-Slinger is the result of two years of development an foundry testing.

This new advancement in Sandslingers has proven its ability to ra molds with maximum accuracy and uniformity. Its capacity an performance is excelled only by the Speedslingers.

Get complete information now on the new HYDRA-SLINGER or any other Beardsley & Piper product—simply write or phone us. If you wish, we will be glad to make arrangements for you to see Beardsley & Piper equipment in action—write or phone and we will quickly make appointments for your inspection visit.

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Pacific Coast mills and foundries will benefit greatly by the steel industry's billion-dollar expansion program.

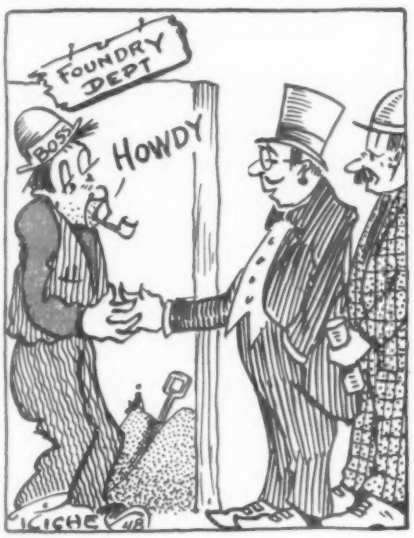
Ohio Ferro-Alloys Corporation
Canton, Ohio

Chicago Detroit Pittsburgh San Francisco Tacoma

(*Continued from page* 209)

to Pg and pronounced Blind Pig. This clever play on words, I mean to say leaving the *i* out from between the *P* and the *g* and pronouncing it Blind Pig was considered to be a jolly good wheeze by all loyal inhabitants and always was trotted out for the benefit of visitors. Took a bit of explaining sometimes, if you know what I mean. Visitors, especially oversea visitors, are notoriously deficient in a sense of humor.

"For many years," I said, "I have striven valiantly to restrain the curiosity impulse with which most people are afflicted and which prompts them to make nuisances of themselves by interrupting conversations to ask questions. However, there is a limit to what a single man can do. There-



The visitors received a hearty welcome

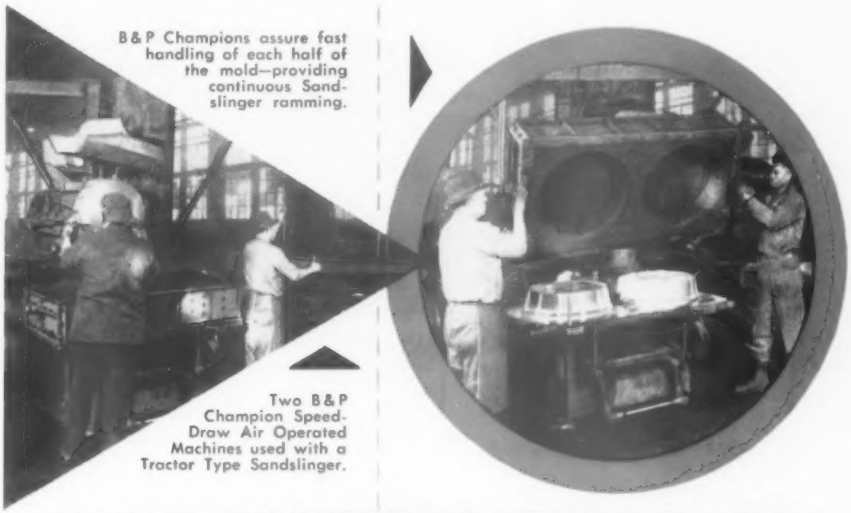
fore, meaning no offense and all that jolly old kind of rot, would you mind telling me what possible connection there is between an English mystery story and a chaplet that causes a casting to leak. Not that I care, one way or another, but I anticipate a little pleasure watching you floundering around like a pig in a poke, or the well known cat in a tar barrel. I rather fancy, my good man, I have you up a tree, or to use a quaint Americanism, up a saline waterway in a punt without either an oar or rudder.

"Well," said Bill, "I'll tell you. Curiosity is a form of disease that has afflicted mankind since Adam had a go at the apple. Generally leads to trouble. Remember Blue Beard's wives? However, in the present instance I consider your curiosity rather flattering. Shows that you are following me with the closest interest and attention. Brace yourself, my dear young fella. We'll come to the chaplets almost immediately. Le's

draw the mold

FAST AND ACCURATELY

• For smooth, accurate draw . . . for fast handling of cope and drag . . . use a B&P Champion Speed-Draw. Speed-Draws maintain positive pattern height resulting in perfect joint and uniform castings. Levelling of the machine is not required, power is applied to the center of the load and not through the crank mechanism. Pattern mounting is simplified and low in cost, and pattern changes can be made quickly and easily with a minimum interruption of production. Speed-Draws are often used with various types of Sandslingers and the combination assures peak capacity for both machines.



B&P Champions assure fast handling of each half of the mold—providing continuous Sandslinger ramming.

Two B&P Champion Speed-Draw Air Operated Machines used with a Tractor Type Sandslinger.

B & P CHAMPION SPEED-DRAW

• 11 Models, both Stationary and Portable to cover maximum range of mold sizes.

• Each model quickly adjustable for maximum variation of mold size.

• Minimum overall height for maximum draw obtained.

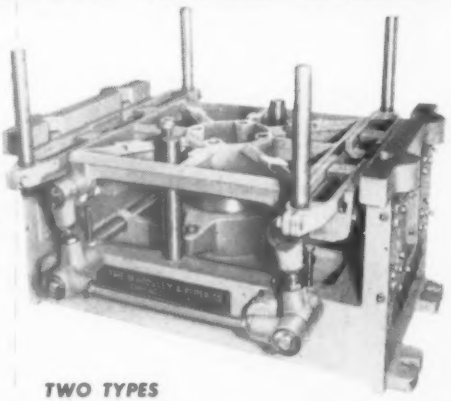
• No time consumed in rolling over.

• Crank mechanism is positive equalizer.

• Low maintenance cost.

• Time tested—used in many foundries—large and small.

WRITE FOR NEW SPEED-DRAW CATALOG!



TWO TYPES

1. B&P Champion Speed-Draw Air Operated: Stationary Model—can be towed on skids (illustrated above). Portable Model on wheels.

2. B&P Champion Speed-Draw Jr. Air or Hand Operated.

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Division of Pettibone Mulliken Corporation

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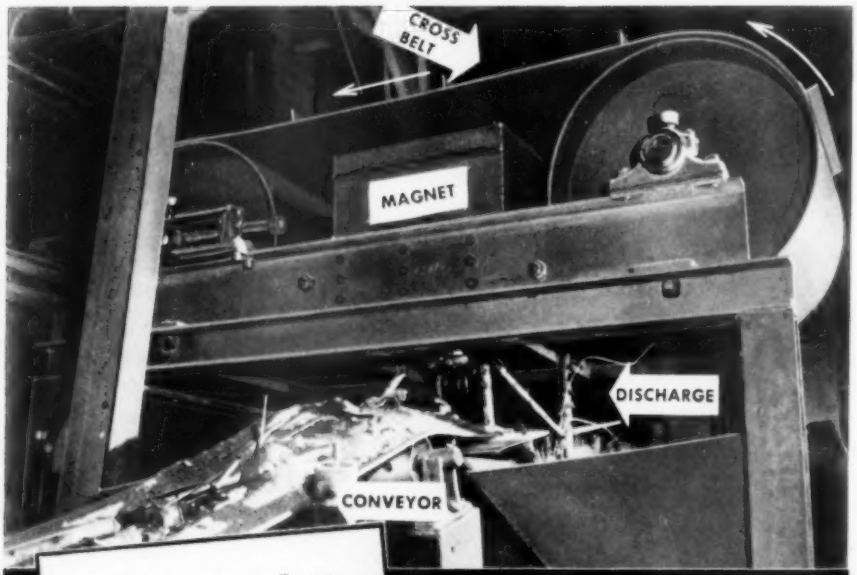

Facts . . . from Ferro Machine and Foundry Co., Cleveland:

RECOVERS 5 tons of iron from waste sand every 24 hours — 25% greater recovery than previously!

SAVES 48 man hours per day — eliminates need for two pickers and one shoveler each shift because iron is now discharged to waist high hopper instead of to floor!

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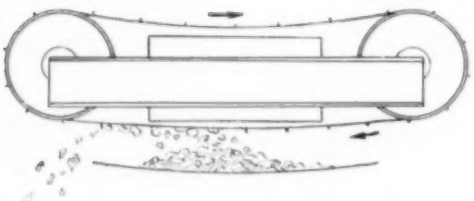
with DINGS *Self-Cleaning* Rectangular Magnet*

Ferro Machine and Foundry has discovered a gold mine in the newly developed Dings *self-cleaning* rectangular magnet. Here's why: No other magnet available is comparable to this new Dings unit. It is extremely effective at distances as great as 12 inches from the magnet face! The flux pattern is uniform across entire magnet—no dead spots! It is completely automatic. Available in any size required to do the job. Will remove iron from belts traveling at speeds too great for other types of magnets. Capacity is more than adequate for the heaviest quantities of iron ever encountered. This magnet separator is really worth knowing about. Ask for CATALOG 301-A.

*IT'S NEW! HERE'S HOW IT WORKS:



Iron is picked off conveyor by powerful magnetic pull, held tight against underside of moving cross belt which sweeps it out of magnetic field where it discharges into a chute or receptacle

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World's Largest Exclusive Builder
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Dings MAGNETIC SEPARATION HIGH INTENSITY

see. Where did I leave off? Ah, Here she is. The man from Scotland Yard breezes in with his lantern and microscope.

All he has to go by is a pool of blood in the center of the floor—blue blood of course—and the chattering story of the second assistant butler. At an early hour the S. A. had seen the body stretched out in the pool with a yataghan sticking out of the back about 2 ft. Half an hour later when he returned with the maintenance crew—all duly itemized—the body had vanished. The 64 dollar question facing Scotland Yard was WHO DUN IT?

Consider for a moment the present instance and note the resemblance. One chaplet causes a leak. Another chaplet does not cause a leak in the casting. With your experience of years and years in the chaplet business, with all the evidence right there in front of your eyes, and with all the contributing factors on display, and still you do not know the answer, what chance have I? Any opinion I may offer, a long-distance diagnosis, necessarily must be accepted as a guess. Before even venturing to guess I should like to venture a few comments.

1. If the large square head chaplet was satisfactory, why did the customer shift to the small round head and fragile stem chaplet?

2. Why did he use chaplets on a casting 1/2-in. thick designed for pressure resistance? Was there no other possible method for anchoring the core? It is almost a foundry axiom that chaplets should not be used on this class of castings.

3. Evidence in the case is contrary to ordinary experience. A large stem chaplet has a greater chilling effect than a chaplet with a light stem. Therefore the union of metal and chaplet would not be as close and intimate with the first as with the second. In the present instance the metal around the thick stem is tight and leak proof. The metal around the small chaplet leaks. Quite a strain on the old credulity!

4. Was the mold gated at the top, the bottom or in the center belt around the outside? Was the mold made half in the cope and half in the drag, or was it made all in the drag with the belt band of the pattern loose and drawn in after the main pattern was drawn out of the sand? Was the metal poured fast or slow?

After considering all the points of actual evidence submitted, also the many points of supposition, singly and in various combinations, the following theory is offered to account for the failure of the smaller chaplets:

When metal entered the mold the light stems were raised almost immediately to a temperature equal to that of the surrounding iron. Weakened at this temperature they bent slightly under the weight of the core and moved away to one side from the light sheath of iron formed almost immediately when surrounded by molten iron. The movement might be almost infinitesimal, but still sufficient to form a cavity and a leaky spot. I would suggest breaking the casting close to the chaplets and examining this possibility. The reason the chaplets on the top did not yield, was because by the time they

(*Concluded on page* 216)

the grinding job

Grinding with efficiency and economy on the production lines of American Industry . . . from precision finishing a wide variety of component parts for the automotive industry to rough snagging castings and billets in foundries and steel mills. *Every industrial plant uses grinding wheels!*

the wheel

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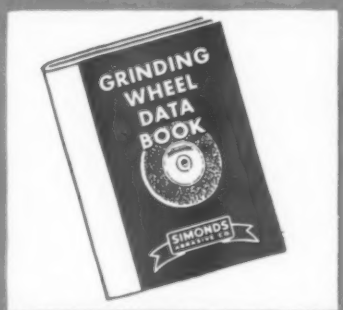

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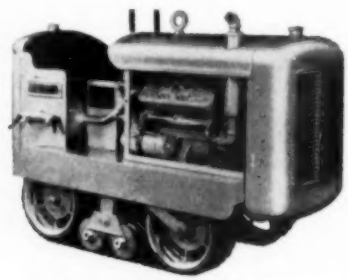
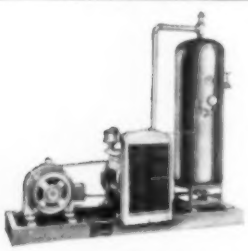
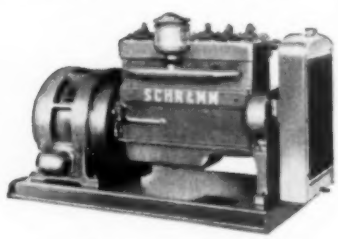


No. 60 Self-Propelled Compressor

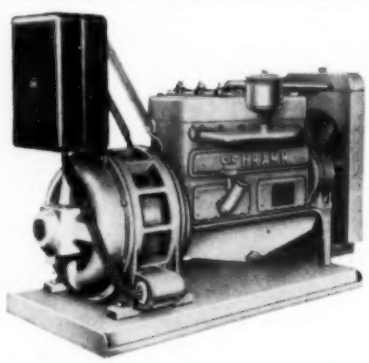


V-Belt Drive with Cooling Unit



Built-in Motor with Cooling Unit

"V" Belt on Flat Pulley Drive



Built-in Motor Drive with Cooling Unit and Starter

SCHRAMM INC.

THE COMPRESSOR PEOPLE • WEST CHESTER • PENNSYLVANIA

(*Concluded from page* 214)

were surrounded by molten iron, the metal at the bottom and sides had formed a skin around the core, exerting sufficient pressure to grip the core and prevent it from exerting full upward pressure against the cope chaplets.

WESTINGHOUSE OPERATES NEW AUTOMATIC UNIT

(*Continued from page* 84)

the blower. As the piston and table of the blower travel upward the pallet plate and flask is raised and sealed against the drag pattern on the blower head and the mold blown in that position. The volume of molding sand blown is approximately 175 pounds per flask. On the down stroke of the table and piston the mold is drawn away from the drag pattern on the head of the blower while the cope pattern remains in the mold on the pallet plate.

This pallet plate and partially completed mold are moved on the next indexing movement into the squeeze position where the pallet plate and flask are picked up in much the same manner as in the previous operation and raised against the drag pattern mounted on the squeeze machine head and squeezed under a pressure of about 50 tons. The pattern in this case is a true one and the result is an accurately formed pattern impression. The mold is drawn away from the drag pattern on the down stroke of the squeeze piston. The mold is now accurately and completely formed, with the flask resting on the pallet plate and the cope pattern still in the mold.

On the next indexing movement of the machine, the pallet plate carrying the flask and mold is moved into the draw machine where the flask and mold are lifted from the cope pattern on the pallet plate by means

(*Continued on page* 218)

Equipment Suppliers

Manufacturers who assisted in the development of parts of the automatic molding unit:

Cleveland Tramrail Division, Wickliffe, O.
Eastern Clay Products Co., Jackson, O.
Hines Flask Co., Cleveland
International Molding Machine Co., La Grange Park, Ill.
Master Pattern Co., Cleveland
Modern Equipment Co., Port Washington, Wis.
National Engineering Co., Chicago
Ohio Steel Foundry Co., Lima, O.
Claude B. Schneible Co., Detroit
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NEW YORK, N. Y.
New York Sand & Facing

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NIAGARA FALLS
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BUFFALO 17, NEW YORK

(*Continued from page* 216)

of draw pins and the flask is clamped to the traveling head of the draw machine. The now empty pallet plate and cope pattern are immediately carried across and started on the return journey to receive another empty flask and start on the next cycle of operation as shown in Fig. 2. The traveling head of the draw machine with the flask and completed mold moves over the stacking position where the stacking machine receives the mold and the head of the draw machine returns to the original position to receive the next mold.

Molds Are Stacked Automatically

As has been explained, at the stacking position completed molds are received from the draw machine, closed on the flask pins, arranged in stacks of six flasks each. The mold stacks are then moved out onto an intermediate conveyor that can be seen in Fig. 8 where each stack of molds is engaged and pushed onto the mold conveyor enroute to the pouring area. The functioning of the stacker mechanism is completely automatic and is quite ingenious in design and operation. The vertical travel of the piston and table which supports the molds is regulated by electric-eye control in such manner that as the stack is being built up, the stacking mechanism progressively maintains the correct level to receive each successive flask as it is received from the draw machine. When the stack has been built up to the required height of six molds the completed stack is automatically moved off the stacking machine and the piston and table return to the initial level to receive the next mold and start building another stack. Cores are set at the stacking position as can be seen in Fig. 6. Bottom boards for new stacks are pushed onto the plate by the hydraulically-operated ram shown in Fig. 12.

The sand-conditioning and sand-and-mold conveying systems, are of major importance in the arrangement and overall operation of the unit as a whole. The sand system contains the usual equipment, including mixing mill, conveyors, elevators, bins, disk feeder, shakeout, dust collector, and related minor items all designed and built to perform their required functions as integral parts of the unit proper. Views of some of the sand handling equipment are shown in Figs. 13, and 17. The mold conveyor is a connected series of plates supported by carriages moving on rails, and forms a loop completely surrounding the other equipment with the exception of the shake-

(*Continued on page* 220)

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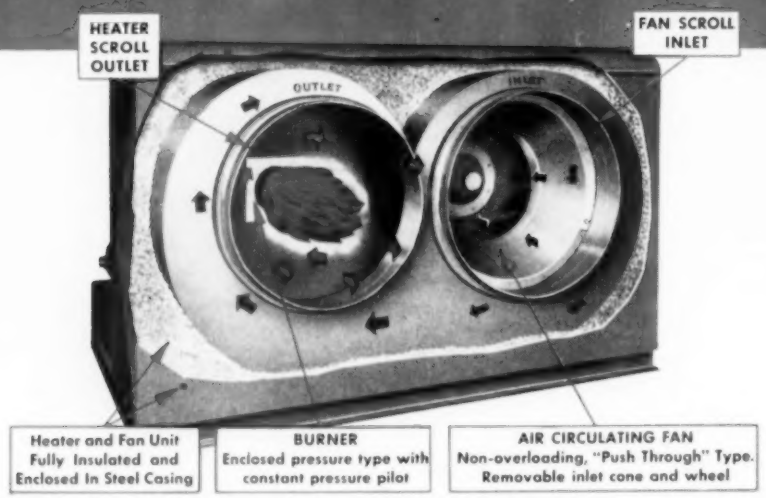
NEWCOMB-DETROIT Scroll-Aire Direct-Fired OVEN HEATER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(*Continued from page* 218)

out and sludge discharge from the dust collectors which, for obvious reasons, are located outside the conveyor loop.

The mold conveyor is complete with cooling hood, exhaust fans, etc., and moves intermittently in step with the predetermined intervals of the molding operation. An intermediate conveyor section and pusher mechanism convey mold stacks from the molding machine onto the mold conveyor. A clear conveyor plate always is spotted at the correct time and position to receive each successive stack of molds as it is delivered. Included as part of the mold conveyor is an intermediate conveyor section and pusher mechanism for returning bottom plates automatically from the mold conveyor to the stacking position.

Actuated by Hydraulic Power

Mechanical movement pertinent to the sand and conveying systems is actuated by hydraulic power under electrical control and is synchronized with the overall molding cycle. Manual assistance is required only in sand mixing control, loading of empty flasks on the pallet plates, spotting the bottom plates on the stacker mechanism, operation of the overhead handling equipment at the shakeout, setting of cores when required, and general supervision of the operation as a whole.

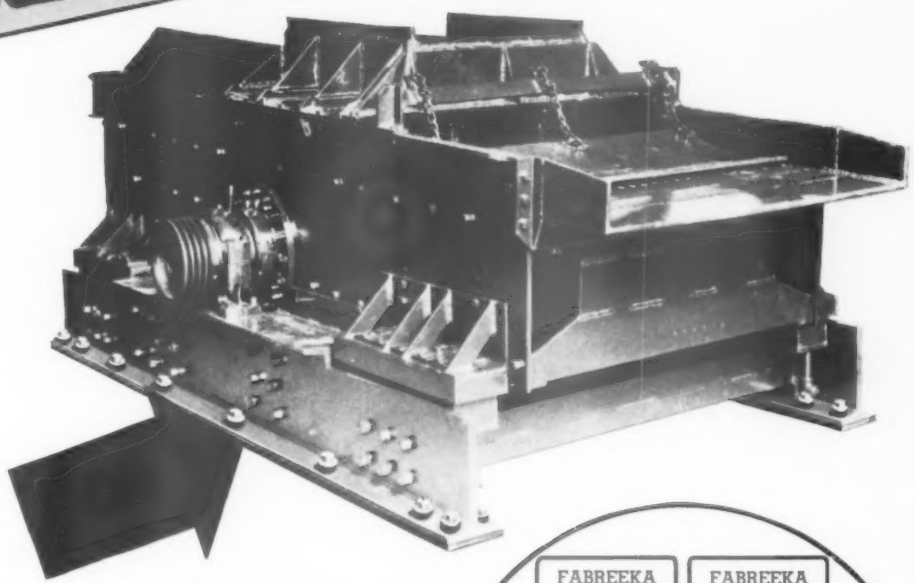
Stacked molds are poured by a pouring crew. Metal is brought direct from the central melting section of the foundry in covered, insulated, geared ladles of the cylindrical type. The pouring ladles are mounted on electric hoists and are conveyed to the pouring area by means of an overhead handling system. The pouring platform shown in Fig. 7 is located on the outside of the conveyor loop at conveyor height and is approached by a ramp from the foundry floor level. Stacked molds with weight and runner cup in position are approximately 43 in. in height above conveyor level. An electrically-operated elevator section with pendulum control has been incorporated in the overhead handling system to raise the pouring ladles to the required height to bring the ladle lip over the runner cup when the mold stacks are in position on the conveyor. The mold stacks are poured through a central sprue and a carefully worked out gating system.

After pouring, the stacked molds are conveyed by the mold conveyor in a series of intermittent movements around the conveyor loop and through

(*Concluded on page* 222)

Under Shakeout Machines

FABREEKA



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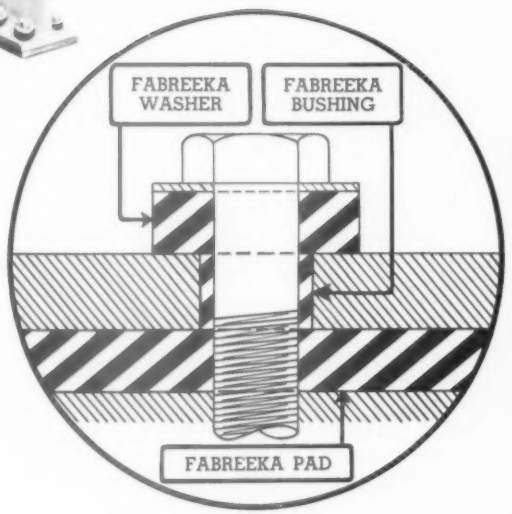

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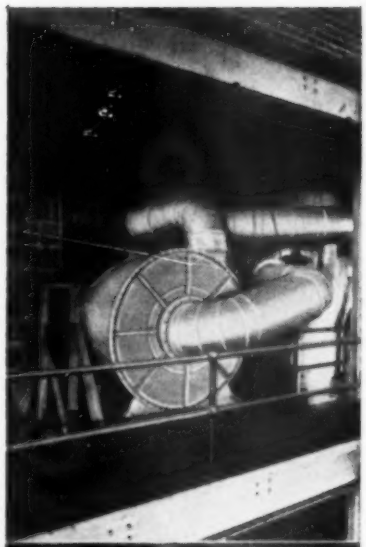
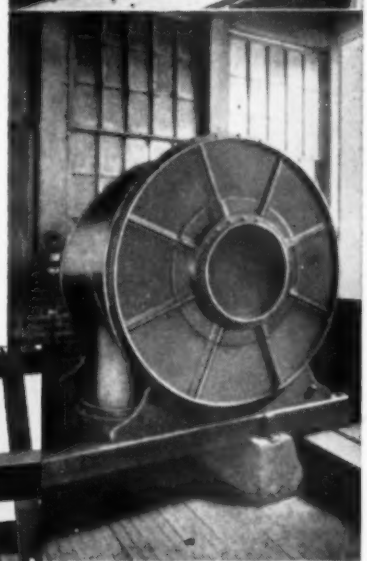
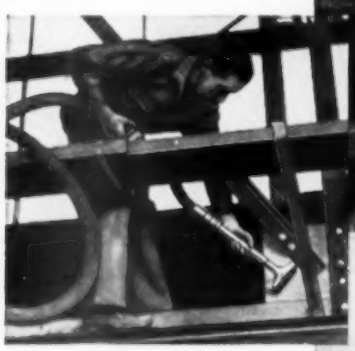






ASK FOR BULLETINS

Foundries	No. 112
Data Book	No. 107
Gas Boosters	No. 109
Four Bearing	No. 110
Blast Gates	No. 122
Technical Bulletin	No. 126

332-B

SPENCER HARTFORD

THE SPENCER TURBINE CO.

HARTFORD 6, CONN.

(*Concluded from page* 220)

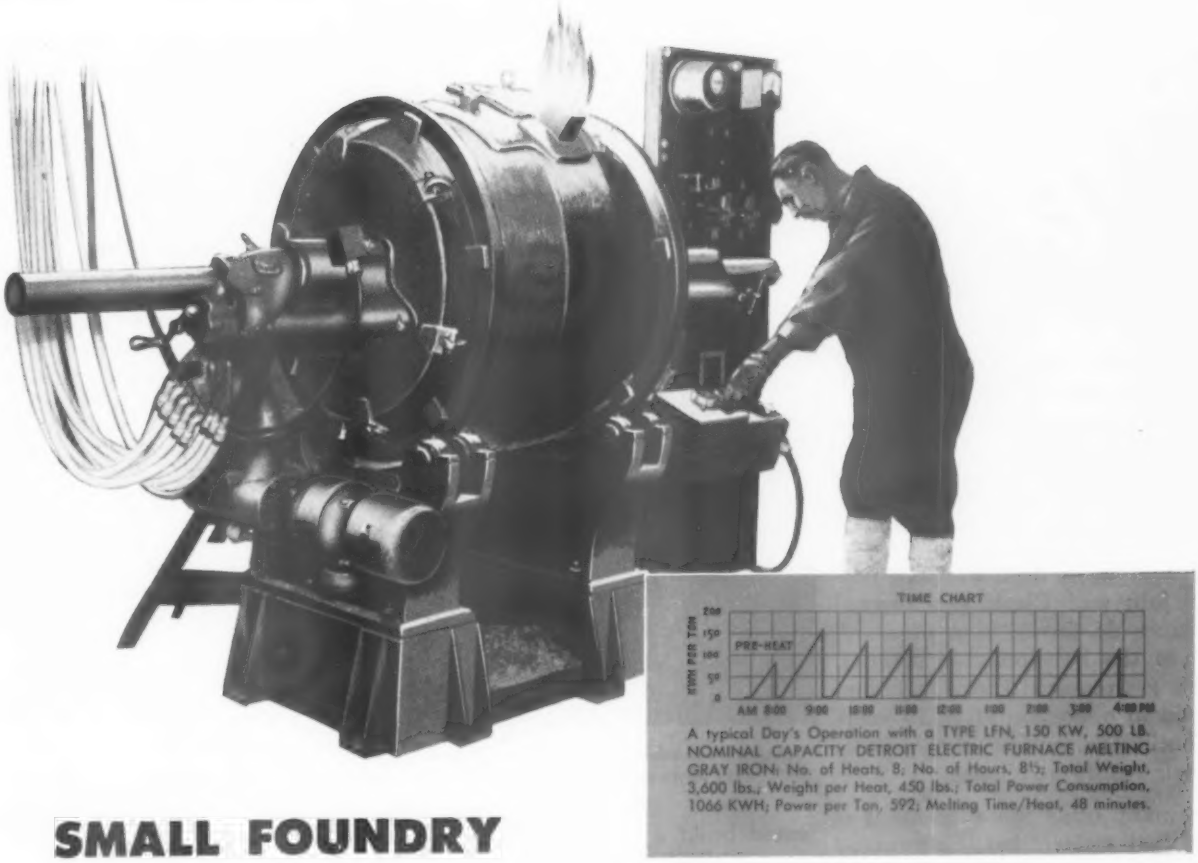
the necessary cooling period to the shakeout. Here each stack of six flasks is picked up by a specially designed air-operated shakeout bail with overhead handling facilities, and carried over the shakeout as seen in Fig. 14 where the sand and castings are shaken out on an inclined, vibrating screen. The stack of empty flasks is deposited adjacent to the loading position of the molding machine. As the sand and castings fall onto the vibrating screen, the sand is returned to the system and the castings are carried over the end of the screen. A gate of castings is shown in Fig. 10.

The flow of castings from the shakeout is gathered in casting containers which are picked up by a power driven electric hoist and taken to the cleaning mills.

Operated by Control Boards

Of extreme importance in the overall operation of this automatic molding unit is the electrical control system, which is the nerve center of the unit. This system was designed by Westinghouse to meet the requirements as specified, and is housed in a specially constructed dust-proof room located in the foundry and adjacent to the unit. The room is of concrete block construction and lighted by fluorescent fixtures. Many windows are provided through which the operating equipment can be inspected. In this room are panel boards, like those shown in Fig. 16, on which are mounted relays, timers, master switches, and other instruments which govern the functioning of the various items of equipment which combine to make possible an operation of this nature. In this room also are the hydraulic pumps and motors which supply motive power for the unit.

The panel boards are arranged in two banks, one controlling the molding functions and the other the sand and conveyor systems. While the master control switches are located in the control room, there are push button controls at each of the principal work positions throughout the unit, as can be seen in Fig. 15. Any single operation can be performed by manual control or the related mechanical movements common to any one function can be set for automatic operation. Controls are also available to lock the complete series of operations into a single complete cycle. Safety buttons are located at strategic positions throughout the unit so that operation can be stopped at any time. The safety factor has received careful and generous treatment in all respects.



A typical Day's Operation with a TYPE LFN, 150 KW, 500 LB. NOMINAL CAPACITY DETROIT ELECTRIC FURNACE MELTING GRAY IRON: No. of Heats, 8; No. of Hours, 8½; Total Weight, 3,600 lbs.; Weight per Heat, 450 lbs.; Total Power Consumption, 1066 KWH; Power per Ton, 592; Melting Time/Heat, 48 minutes.

SMALL FOUNDRY casts 12,000 threading dies weekly with DETROIT ELECTRIC FURNACE

A BOTTLENECK that curtailed production of small castings, poured at high temperatures, *was quickly broken* at a manufacturing plant in northwestern Pennsylvania with a fast melting Detroit Rocking Electric Furnace. The company established their own 7-man foundry, installed a Type LFN, 150 Kw., 500 lb. capacity Detroit Electric Furnace — and now they're melting 450 lb. heats of gray iron to pour 12,000 castings per week. Daily power consumption averages 1050 Kw hours or 590 KWH per ton. Melting time is 48 minutes per heat. Metal is of *higher and more uniform quality*, because the one-man controls on the Detroit Electric Furnace consistently *maintain high pouring temperatures desired*—2900°F. —and afford constant regulation of melting time, composition, and other melting factors.

The furnace shell of a Detroit Electric Furnace *is easily removed*, and in the event of a burned out lining, a spare, previously lined, shell can be installed with *only a brief interruption of production.* Detroit Electric Furnaces are made in various sizes and capacities. Send us your production requirements and our engineers will recommend the specific model designed to speed melting of ferrous and/or non-ferrous metals in your plant.

DETROIT ELECTRIC FURNACES

DETROIT ELECTRIC FURNACE DIVISION • KUHLMAN ELECTRIC COMPANY • BAY CITY, MICHIGAN

FOREIGN OFFICES: BIRLEC, LTD., Birmingham, England, Representative for Europe and British Commonwealth excluding Canada. EQUIPAMENTOS INDUSTRIAS "EISA" LTD., Sao Paulo, Brazil, Representative in Brazil. M. CASTELLVI, INC., 150 Broadway, New York 7, N. Y., Representative in Chile, Argentina, Peru, and Venezuela. CASA COVACEVICH, Mexico City, D. F., Mexico.

MATERIAL HANDLING News

Electric Fork Trucks and Gas Fork Trucks — CLARK BUILDS BOTH

It is as true in the field of materials handling as it is in the field of medicine that a completely objective and unbiased approach is essential to any search for facts.

In many installations gas-powered equipment does the best possible job; and Clark gas-powered machines do these "best possible" jobs in the best possible manner. Many gas-powered Clark machines remain in operation after 20 years of continuous service—ample proof of their sturdy excellence.

Gas-powered carloader with HI-LO-STACK clears car doors easily, tiers to 11 feet.

In many other installations it is clear that electric battery-powered machines will serve most efficiently and economically—and in these instances Clark sales engineers recommend Clark electrics.

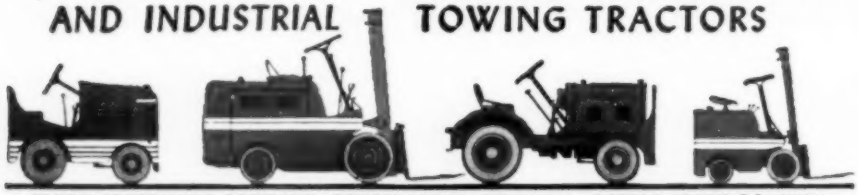
Electric fork truck loads palletized cases of canned goods on trailers.

Clark undertook the manufacture of electric battery-powered fork trucks with a conviction that it could build a better machine than it could find on the market, and at a lower cost. Exclusive initial economies which Clark foresaw and achieved—and which it affords Clark users—resulted from Clark's mass production of both gas and electric machines as well as of most of their major components, and from its unparalleled pattern of parts interchangeability. These are basic advantages immediately apparent to seasoned production men.

It must be equally apparent—that whether Clark's recommendation is for gas-powered equipment or for electric battery - powered equipment, it is based on *facts*, and is free of prejudices arising naturally out of a one-line approach.

We believe that it will pay you to CONSULT CLARK.

CLARK ELECTRIC AND GAS POWERED FORK TRUCKS AND INDUSTRIAL TOWING TRACTORS



CLARK EQUIPMENT COMPANY, TRUCTRACTOR DIVISION, BATTLE CREEK 16, MICH.
REPRESENTATIVES IN PRINCIPAL CITIES THROUGHOUT THE WORLD

Northwestern Holds Educational Meeting

NORTHWESTERN Technological Institute, Evanston, Ill., on Apr. 8 acted as host to the Foundry Educational Foundation and high school instructors and students in the midwestern area. Last fall the institute was added as the sixth university which is co-operating with the foundation in providing foundry engineering training, and purpose of the meeting was to acquaint that organization and high school representatives with the institute's facilities and program. Attendance at the meeting exceeded 200.

Officers of the foundation who attended were President Anthony Haswell, president, Dayton Malleable Iron Co., Dayton, O.; Vice President Peter E. Rentschler, president, Hamilton Foundry & Machine Co., Hamilton, O.; Secretary James H. Lansing, consulting engineer, Malleable Founders' Society, Cleveland; Executive Director George K. Dreher, Cleveland; and Trustees Stowell C. Wasson, general manager, National Malleable & Steel Castings Co., Chicago, and Bruce L. Simpson, president, National Engineering Co., Chicago.

Discuss Foundry Program

Representing Northwestern Technological Institute were Dean Ovid W. Eshbach; Prof. Burgess H. Jennings, chairman of the department of mechanical engineering, and in charge of the foundry program; Assistant Professor Ray S. Lindenmeyer who is in charge of the laboratories; and Richard H. Cole, lecturer in the mechanical engineering department.

Purpose of the meeting was explained by George K. Dreher, executive director of the foundation, following which welcomes were extended by Dean Eshbach on behalf of the institute and President Haswell on behalf of the foundation. Then the visitors were conducted on a tour of the institute which included the foundry.

Upon completion of the tour, the foundry program at Northwestern was discussed by Mr. Cole. He commended the foundation on its project in light of what it means to students. He announced that the institute soon would break ground for a new building into which the foundry department will be moved. The new facilities will provide 3500 square feet with sand laboratories, coreroom, a well mechanized foundry with basement sand storage, overhead crane and testing laboratory.

The present foundry course deals

(*Concluded on page* 226)

We are well pleased with No. 172 Mexican Blacking

KENNEDY-VAN SAUN MFG & ENG CORPORATION
DANVILLE, PENNSYLVANIA

The United States Graphite Company
1621 Holland Ave.
Saginaw, Michigan

Gentlemen:

"The large castings -- the spider, and top and lower shells -- shown in the photograph of our No. 36 Kennedy Gyratory crusher were molded in our foundry using No. 172 Mexican Blacking. Note the resultant fine finish.

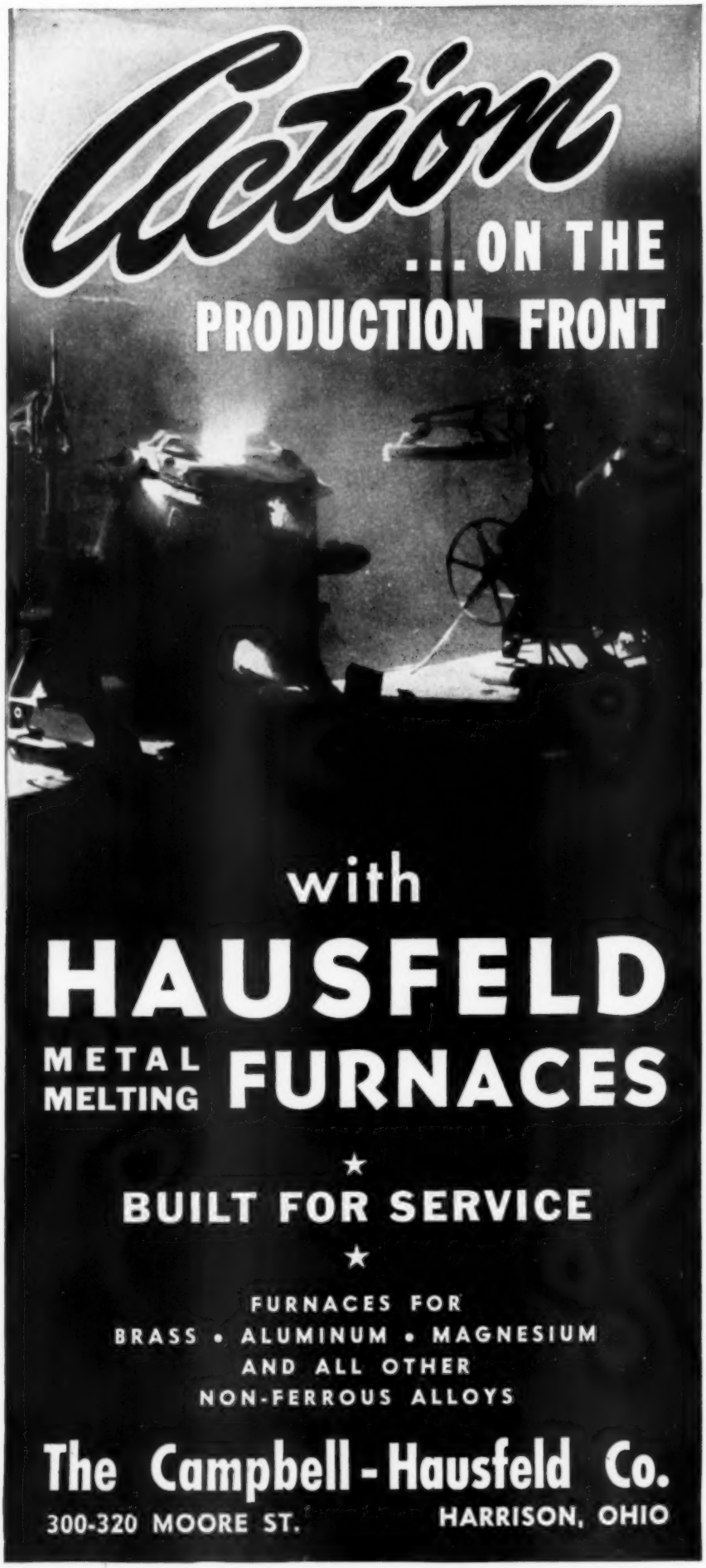
"We are very well pleased with the results obtained in using your product and we would be glad to recommend it to any other foundry for this particular application and use."

Yours very truly,
KENNEDY-VAN SAUN MFG. & ENG. CORP.
By: L. V. Murray, General Supt.

This excerpt of a letter from Mr. L. V. Murray, General Superintendent of the Kennedy-Van Saun Manufacturing and Engineering Corp., to The United States Graphite Company testifies to the excellence of No. 172 Mexican Blacking. A high quality wet blacking ready mixed with bond, No. 172 is easily and smoothly applied to cores and dry sand molds with swab, brush or spray. It turns the hottest iron and allows sand to peel cleanly, making it ideal for medium, extra large, and pressure castings weighing 1 to 25 tons.

Use No. 172 Mexican Blacking to insure smoother, cleaner castings in your foundry. Write today for complete information.

THE UNITED STATES GRAPHITE COMPANY • SAGINAW, MICHIGAN



(*Concluded from page 224*)

with fundamentals, possibilities and limitations of foundry work, and limitations in casting design. A second course will deal with sand practice and melting, with other courses to be initiated. The institute proposes not to overlook the human angle in its foundry instruction.

An attendance poll showed that those present at the meeting represented the states of Wisconsin, Iowa, Michigan, New York, Ohio and Indiana, as well as Illinois. At least one-half were high school students and instructors interested in the possibilities in foundry training.

Prof. Jennings presided at the afternoon session at which William G. Mixer, general superintendent, foundry, Buick Motor Division, General Motors Corp., Flint, Mich., in an address on "An Example of Foundry Engineering" described how his company during the war built and put into operation in a period of 5½ months a new foundry to produce aluminum cylinder heads for Pratt & Whitney aircraft engines.

Foundry Oportunities Outlined

Mr. Dreher, later speaking on "Opportunities in the Foundry Industry," explained that Mr. Mixer's presentation had been included in the program to show what can be done in the foundry. He pointed out that not enough training of youth for the foundry industry has been done in the past.

Through the citing of statistics, Mr. Dreher outlined opportunities in the foundry field in managerial, technical and humanistic capacities. The industry has more than 800 openings for college graduates per year and the six engineering schools co-operating in the foundation program cannot produce this number. This year, Mr. Dreher estimates, there will be three or four job opportunities for each graduate.

The meeting was concluded with the showing of a motion picture, "New Foundry Horizons," through courtesy of National Engineering Co., Chicago. This picture, starting off with old and obsolete methods in producing castings, shows how efficiency and good working conditions result from use of modern sand handling and molding equipment.

In connection with the meeting, Northwestern announced the award of four scholarships in the new course on foundry techniques, under the Foundry Educational Foundation sponsorship. The four students designated were Maurice F. Dunne Jr., Winnetka, Ill.; Vincent R. Howard, Chicago; Arthur Rutenberg, Chicago, and Harold A. Roman, Moline, Ill.

TENTATIVE SPECIFICATIONS FOR ALUMINUM-BASE ALLOY SAND CASTINGS

ASTM Designation: B 26-47 T;

Issued 1933; Revised, 1936, 1937, 1941, 1942, 1943, 1944, 1946, 1947.

Scope

1. These specifications cover aluminum-base alloy sand castings having a specific gravity of 3 or less. Fifteen alloys are specified and are designated as shown in Table I (see Explanatory Notes and table of supplementary data in the Appendix).[1]

Manufacture

2. The responsibility of furnishing castings that can be laid out and machined to the finished dimensions within the permissible variations specified, as shown on the blueprints or drawings, shall rest with the manufacturer, except where pattern equipment is furnished by the purchaser. Sufficient stock shall be allowed for shrinkage and, where required, for finishing; but castings of excessive size or weight shall not be furnished.

[1] S.A.E. Specifications Nos. 33, 34, 35, 38, 39, 320, 322, and 323 conform in general with the requirements of alloys CS22, CG1, S2, C1, CN21, G1, SC21, and SG1, respectively.

Chemical Composition

3. The alloys shall conform to the requirements as to chemical composition prescribed in Table I.

Sampling for Chemical Analysis

4. (a) Samples for chemical analysis shall be selected, so far as possible, by heats or melts, or groups of heats for melts, unless otherwise agreed upon by the manufacturer and the purchaser.

(b) The sample for chemical analysis shall be taken by sawing, drilling, or milling the casting or test specimen in such a manner as to be representative of the material.

(c) The saw, drill, cutter, or other tool used for taking the sample shall be thoroughly cleaned. No lubricant shall be used in the operation, and the sawings or metal chips shall be carefully treated with a magnet to remove any particles of iron introduced in taking the sample.

TABLE 1—CHEMICAL REQUIREMENTS

Alloy	Aluminum, per cent	Copper, per cent	Iron, max., per cent	Silicon, per cent	Manganese, max., per cent	Magnesium per cent	Zinc, max., per cent	Chromium, max., per cent	Titanium, max., per cent	Nickel, max., per cent	Other Elements, max., per cent Each	Other Elements, max., per cent Total
C1	remainder	4.5 ± 0.5	1.0	1.5 max.	0.3	0.03 max.	0.3	..	0.2	..	0.05	0.15
G1	remainder	0.1 max.*	0.5*	0.3 max.	0.3*	4.0 ± 0.5	0.1	..	0.2	..	0.05	0.15
G3	remainder	0.2 max.	0.3	0.2 max.	0.1	$10.0 \begin{smallmatrix}+0.6\\-0.5\end{smallmatrix}$	0.1	..	0.2	..	0.05	0.15
S1	remainder	0.1 max.	0.8	$5.0 \begin{smallmatrix}+1.0\\-0.5\end{smallmatrix}$	0.3	0.05 max.	0.3	..	0.2	..	0.05	...
S2	remainder	0.3 max.†	0.8	$5.0 \begin{smallmatrix}+1.0\\-0.5\end{smallmatrix}$	0.3	0.05 max.	0.3	0.2	0.2	..	...	0.3
CG1	remainder	10.0 ± 0.8	1.5	2.0 max.	0.5	0.25 ± 0.10	0.5	..	0.2	0.3	...	0.3
CN21	remainder	4.0 ± 0.5	1.0	0.7 max.	0.3	1.5 ± 0.3	0.3	0.2	0.2	2.0 ± 0.3	0.05	0.15
CS5	remainder	4.0 ± 0.5	1.2	3.0 ± 0.5	0.5	0.05	0.5	..	0.2	0.3	...	0.5
CS22	remainder	7.0 ± 1.0	1.4	2.5 ± 1.5	0.5	0.07 max.	2.5	..	0.2	0.3	...	0.5
GS1	remainder	0.3 max‡	0.6‡	1.8 ± 0.4	0.8‡	4.0 ± 0.5	0.3	0.2	0.2	..	0.05	...
SC8	remainder	$3.5 \begin{smallmatrix}+1.0\\-0.5\end{smallmatrix}$	1.2	$6.0 \begin{smallmatrix}+1.0\\-0.5\end{smallmatrix}$	0.5	0.15 max.§	1.0	..	0.2	0.3	...	0.5
SC21	remainder	1.25 ± 0.25	0.8°	5.0 ± 0.5	0.5*	0.5 ± 0.1	0.3	0.2	0.2	..	0.05	0.15
SC42	remainder	1.5 ± 0.5	1.0	7.8 ± 0.8	0.4 ± 0.2	0.4 ± 0.2	0.5	0.3	0.3	0.2	...	0.5
SG1	remainder	0.2 max.	0.6	7.0 ± 0.5	0.3	0.3 ± 0.1	0.3	..	0.2	..	0.05	0.15
ZG41	remainder	0.3 max.	1.0	0.25 max.	0.3	$0.6 \begin{smallmatrix}+0.05\\-0.1\end{smallmatrix}$	5.5 ± 0.5	0.5 ± 0.1	0.2 ± 0.1	..	0.05	...

* For cooking utensils copper 0.3 per cent max., manganese 0.6 per cent, max., manganese 0.6 per cent, max., and iron 0.6 per cent, max., are permitted.

† For general use, other than cooking utensils, copper may be 0.6 per cent, max.

‡ If copper plus iron exceeds 0.5 per cent, a manganese content of at least 0.3 per cent is desirable.

§ If agreed upon by the manufacturer and the purchaser, a magnesium content of 0.5 per cent, max., is permissible.

° If the iron content exceeds 0.4 per cent, it is desirable to have manganese present in an amount equal to one-half of the iron.

NOTE 1.—Analysis shall regularly be made only for the elements specifically mentioned in this table. If, however, the presence of other elements is suspected, or indicated in the course of routine analysis, further analysis shall be made to determine that the total of these other elements is not present in excess of the limits specified in the last column of the table.

NOTE 2.—The following applies to all specified limits in this table: For purposes of acceptance and rejection, an observed value or a calculated value obtained from analysis should be rounded off to the nearest unit in the last right hand place of figures used in expressing the specified limit.

TENTATIVE SPECIFICATIONS FOR ALUMINUM-BASE ALLOY SAND CASTINGS

ASTM Designation: B 26-47 T;

Issued 1933; Revised, 1936, 1937, 1941, 1942, 1943, 1944, 1946, 1947.

Method of Chemical Analysis

5. The chemical analysis shall be made in accordance with the Standard Methods of Chemical Analysis of Aluminum and Aluminum-Base Alloys (A.S.T.M. Designation: E 34),[2] or by any other approved method agreed upon by the manufacturer and the purchaser. The analysis may be made spectrographically, provided that, in case of dispute, the results secured by Methods E 34 shall be the basis for acceptance.

Tensile Properties

6. The tension test specimens representing the castings shall conform to the requirements as to tensile properties prescribed in Table II.

Tension Tests

7. The tensile properties shall be determined in accordance with the Standard Methods of Tension Testing of Metallic Materials (A.S.T.M. Designation: E 8).[3]

[2] 1946 Book of A.S.T.M. Methods of Chemical Analysis of Metals.
[3] 1946 Book of A.S.T.M. Standards, Part I-B.

TABLE II.—TENSILE REQUIREMENTS*

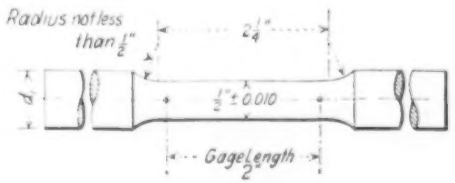
Alloy	Condition	Tensile Strength, min., psi.	Elongation in 2 in., min., per cent
C1	Solution heat treated (Heat treatment No. 1)	29 000	6.0
	Solution treated and aged (Heat treatment No. 2)	32 000	3.0
	Solution treated and aged (Heat treatment No. 3)	36 000	†
	Solution treated and over-aged (Heat treatment No. 4)	29 000	3.0
G1	As cast	22 000	6.0
G3	Solution heat treated	42 000	12.0
S1	As cast	17 000	3.0
S2	As cast	17 000	3.0
CG1	Annealed (Heat treatment No. 1)	23 000	†
	Solution treated and aged (Heat treatment No. 2)	30 000	†
CN21	Annealed (Heat treatment No. 1)	23 000	†
	Solution treated and aged (Heat treatment No. 2)	32 000	†
CS5	As cast	19 000	1.5
CS22	As cast	19 000	1‡
GS1	As cast	17 000	†
SC8	As cast (Heat treatment No. 1)	24 000	2.0§
	Solution treated and aged (Heat treatment No. 2)	30 000	2.5§
SC21	Solution treated and aged (Heat treatment No. 1)	32 000	2.0
	Aged (Heat treatment No. 2)	25 000	†
	Solution treated and over-aged (Heat treatment No. 3)	30 000	†
SC42	As cast (Heat treatment No. 1)	25 000	1.0
	Solution treated and aged (Heat treatment No. 2)	34 000	1.0
SG1	Solution treated and aged (Heat treatment No. 1)	30 000	3.0
	Aged (Heat treatment No. 2)	23 000	†
ZG41	Aged	30 000	3.0

* If agreed upon by the manufacturer and the purchaser, other physical properties may be obtained by other heat treatments such as annealing, aging, or stress relieving.
† Not required.
‡ For information only, not required for acceptance.
§ If the magnesium content exceeds 0.15 per cent, the elongation may be slightly lower.

Test Specimens

8. (a) The tension test specimens shall be separately cast in green sand and shall be cast to size according to the dimensions shown in Fig. 1.

(b) If the castings are to be heat treated, the test specimens representing such castings shall be heat treated with the castings they represent. They shall not be machined prior to test except to adapt the grip ends of the specimen to the jaws of the testing machine in such a manner as to assure axial loading.



NOTE:
The Gage Length, Parallel Section and Fillets shall be as shown, but the Ends may be of any Shape to fit the Holders of the Testing Machine in such a way, that the Load shall be Axial.
In Order to promote the Breaking of the Specimen in the Center it is permissible to use a Taper in the Reduced Section from the Fillets to the Center of not to exceed 0.010 in.
It is recommended, that Diameter d, be from 3/4 to 1."

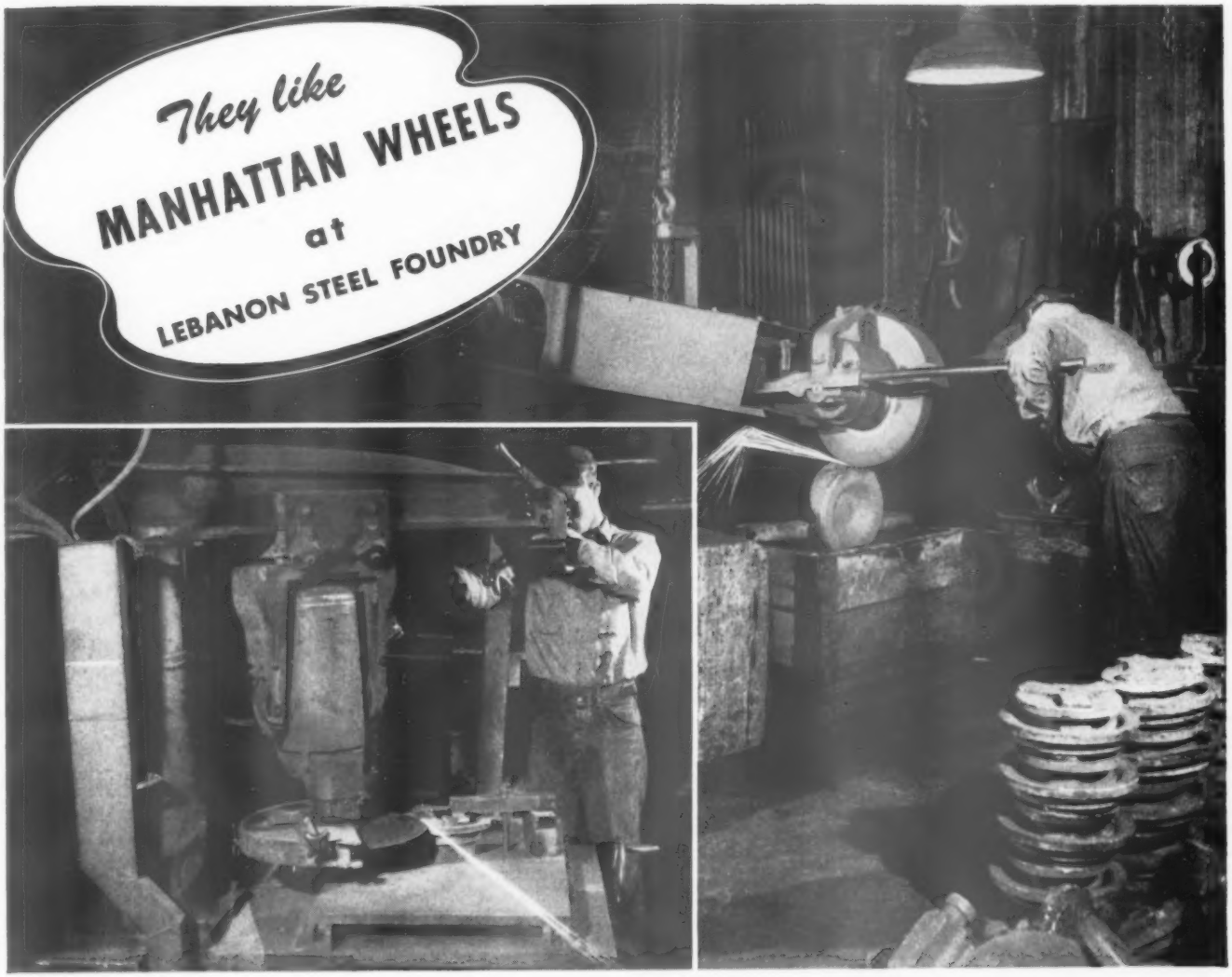
Fig. 1—Tension test specimen

Number of Tests

9. (a) The tension test specimens shall, so far as possible, be selected by heats or melts but, unless otherwise agreed upon by the purchaser and the manufacturer, two tension tests shall be made for each unit of 1000 lb. or fraction thereof of clean castings.

(b) If any test specimen shows defective machining or flaws, it may be discarded; in which case the purchaser and the manufacturer shall agree upon the selection of another specimen in its stead.

(To Be Concluded)



CUT-OFF WHEELS
for Hard and Soft Cutting

Shown here is one of Lebanon's new DeWalt Cut-Off machines which moves into the work either horizontally or vertically. A Manhattan 18" Cut-Off Wheel is making a cool, quick cut on a foundry cast suction head for a chemical pump. Cool cutting is important here where overheating would burn and check the metal surface. This particular metal is Lebanon's "Circle L" #33, 19% chrome and 24% nickel, with some copper content.

One of these modern machines uses anywhere from 10 to 40 wheels per day depending on the alloy and size of the gates and risers being cut.

Manhattan Cut-Off Wheels are used in two specifications for hard and soft cutting. They last longer and cut better than anything tested to date.

SNAGGING WHEELS
for Swing Frames and Stand Grinders

Lebanon Steel Foundry has some of the most modern equipment to speed their expanding foundry operations. Shown here is one of their new Fox High Speed Swing Frame Grinders. A 20" x 2½" x 6" Manhattan Snagging Wheel runs at a peripheral speed of 9,000 feet per minute on this grinder, driven by a 1750 RPM motor.

Manhattan 24" x 3" x 12" Snagging Wheels are used on the Stand Grinders in Lebanon Steel Foundry's efficient layout.

Tests are run periodically to check wheel performance on all grinders. To meet Lebanon's standards of production and keep costs in line, Manhattan Wheels have to maintain a consisten' record of highest output per man hour.

You, too, can get more out of your machines with Manhattan Wheels. Manhattan Abrasive Wheel Engineers help you with metallurgical, cutting, or grinding problems. Simply write to

ABRASIVE WHEEL DEPARTMENT

RAYBESTOS-MANHATTAN, INC.

RAYBESTOS R M MANHATTAN

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PACKINGS — POWDERED METAL PRODUCTS — ABRASIVE & DIAMOND WHEELS — BOWLING BALLS

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Only new *PROTECTO-WELD* design gives you *all three magnet features*

Investment in a welded lifting magnet, to be sound, ought to satisfy three vital requirements. They apply equally to all types of operation, whether steel mill, scrap yard, railroad or fabricating plant.

Is the magnet rugged enough for the roughest jobs? Ohio Protecto-Weld Magnets withstand hard knocks day in and out for years. Heavy-duty outer ring and top plate are welded together ON TOP OF THE MAGNET. Frequent blows against magnet side cannot crack or damage welded area. Magnet remains hermetically sealed against moisture indefinitely!

Does the magnet lift efficiently over extended periods of operation? Ohio Protecto-Weld Magnets use heavier-duty copper coils with non-cracking asphaltum insulation. They operate cooler, lift more uniformly for longer periods of operation.

Can the magnet be serviced, if necessary, quickly and economically? Since the weld on Ohio Protecto-Weld Magnets is ON TOP, it retains its shape, is never dented in. Thus, the weld can be turned down for disassembly without cutting away outer ring. Repairs are effected quickly, economically, without replacing outer pole.

Only Ohio Protecto-Weld Magnets give you *all three big advantages.* Sizes include 39, 55 and 65 inches diameter; 4, 6 or 8-coil construction. Write today for details to Ohio—*leader in magnetic materials handling.*

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OBITUARY

ROBERT E. WENDT, 73, for 35 years instructor in foundry practice at Purdue University, died Mar. 31, in Lafayette, Ind. Mr. Wendt was educated in public schools in Indiana, and later completed a course with International Correspondence Schools. He was associated with the M. Rumely Co., La Porte, Ind., from 1891 to 1899, and spent a year with the Mueller Brass Works, returning to the Rumely Co. where he remained for 10 years. In 1910 he was appointed instructor in foundry practice at Purdue University, in charge of one of the largest technical school foundries in the country. He has contributed extensively to the foundry press and was the author of a textbook on foundry work. Mr. Wendt was a member of the American Foundrymen's Association and the Society for the Promotion of Engineering Education.

* * *

Herman H. Hossler, 57, vice president and secretary, Clio Foundry Inc., Clio, Mich., died Mar. 18 in Saginaw, Mich. Mr. Hossler learned the patternmaking trade with the Jackson & Church Co., Saginaw, later working for Nelson Brothers there, for over 20 years, as foreman of the pattern shop and superintendent of the foundry. In 1941 he joined John and Henry Calkins in organizing the Clio Foundry. Mr. Hossler was a member of the American Foundrymen's Association.

* * *

A. D. White, 78, founder of White Foundry Co., Lincoln, Nebr., died there Mar. 7. Mr. White left the Beatrice Iron Works, Beatrice, Nebr., to become associated with Cushman Motor Works, Lincoln, where he was superintendent of the foundry for 5 years. He established the White Foundry Co. in 1933.

* * *

William P. Ross, 63, vice president and a director of the Standard Tool Co., Cleveland, died suddenly at his home there Apr. 21. Mr. Ross, who had been associated with the company since 1902, was well known in the hardware, mill supply and metal-working industries.

* * *

F. J. Cook, 78, a founder and former president of the Institute of British Foundrymen, died Apr. 5, at Manchester, England. Mr. Cook was a patternmaker by trade and was foundry manager, Beliss & Morcom Ltd., Birmingham, for many years. He served as a director of Rudge Littley, Swan Village, West Bromwich, and later became associated

with the British Cast Iron Research Association in a consulting capacity. He was one of the founders of the Institute of British Foundrymen in 1904, and served as its third president. His contribution to the mechanical and metallurgical developments within the foundry industry were recognized by the award of the Oliver Stubbs Medal and by honorary membership of the institute in 1932.

* * *

Leon H. Marsh, vice president and secretary, Kennedy Valve Mfg. Co. Inc., Elmira, N. Y., died Mar. 11. Mr. Marsh joined the company as traffic manager in 1918, and was appointed assistant sales manager the following year. He was named sales manager in 1941, elected vice president in 1945 and was made a director of the company in 1947. Recently he had been named secretary of the company.

* * *

John S. Coulton, 68, vice president and a director of W. S. Tyler Co., Cleveland, died there in Charity Hospital, May 9. Mr. Coulton, a native of Cleveland, and a graduate of Case Institute of Technology, became associated with the company in 1901, as an office boy. Later he became a salesman, manager of the ornamental iron and bronze division in 1920, and was named vice president in 1929.

* * *

Melville E. Kohler Sr., 51, vice president in charge of sales, Scientific Cast Products Corp., Cleveland, died suddenly May 7, in Philadelphia, while attending the convention of the American Foundrymen's Association. Born and educated in Chicago, Mr. Kohler had been associated with Scientific Cast Products Corp., since 1933.

* * *

Peter D. White, 59, who was elected president of the Babcock & Wilcox Tube Co., New York, on April 8, died suddenly May 6 while en route from the company's plant at Beaver Falls, Pa., to the Alliance, O., plant. He had been with the company 33 years and during the past year had been executive vice president and a director.

* * *

William J. Muhlitner, 56, president of Great Lakes Foundry Sand Co., Detroit, and widely known throughout the foundry industry, died at his home in Detroit, May 11, after a six-month illness. Born in St. Clair, Mich., Mr. Muhlitner joined the Detroit Stoker & Foundry Co. in 1909 as timekeeper, and six years later became assistant manager of Foundry Machine Products Co., an affiliated company. He served there until 1920

"COOLIE" CONVEYING IS COSTLY

Yes, "coolie" conveying is costly because it takes so much manpower to reach modern production capacity levels. If you're using manpower in material handling — you're using a "coolie" system. Conveyors keep manpower on the production line! Investigate Standard Conveyors to handle pieces, parts, units, assemblies, cases, cartons, boxes, barrels, bales, bundles, packages — everything from mail to malleable iron castings! There's one to meet your needs in shop or warehouse. Standard Conveyor Co., General Offices: North St. Paul 9, Minn. Sales and Service in Principal Cities.

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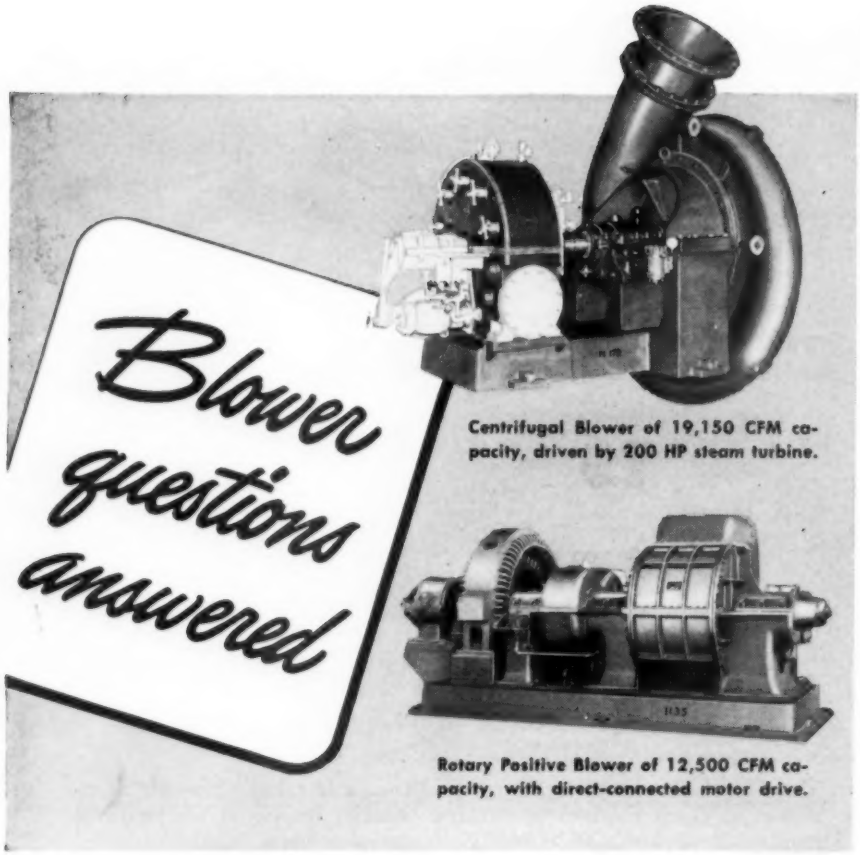
Standard GRAVITY & POWER CONVEYORS

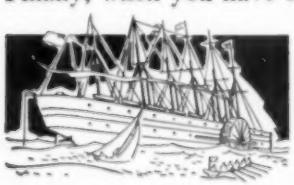

Blower questions answered
Centrifugal Blower of 19,150 CFM capacity, driven by 200 HP steam turbine.
Rotary Positive Blower of 12,500 CFM capacity, with direct-connected motor drive.

by R-C dual-ability

When you put your blower questions up to Roots-Connersville, you gain these important advantages:

1. Long experience in the adaptation of blowers to needs of the iron and steel industry, coupled with the forward-thinking of our alert engineers.
2. Our *dual-ability* to supply either Rotary Positive or Centrifugal Blowers, whichever type is best fitted to the specific work.
3. A wide range of standard capacities, from 5 CFM to 50,000 CFM (or higher), adapted to any modern drive, which makes for lower prices and faster deliveries than "special" designs.

Finally, when you have selected the R-C Blower that satisfies your requirements, you can be certain of sound, sturdy construction, low maintenance and operating costs, and a long life of profitable performance. For accurate answers to your blower questions, consult us.



In 1858, when the Atlantic Cable carried its first message, "Roots" had been building blowers for four years, since 1854. We're not good because we're old, but old because we're good.

ROOTS-CONNERSVILLE BLOWER CORPORATION
806 Madison Ave., Connersville, Ind.

ROOTS-CONNERSVILLE BLOWER BUILDERS R-C SINCE 1854
ROTARY CENTRIFUGAL
BLOWERS · EXHAUSTERS · BOOSTERS · LIQUID AND VACUUM PUMPS · METERS · INERT GAS GENERATORS

ONE OF THE DRESSER INDUSTRIES

when he joined the late John Croneweth, who had organized the Great Lakes Distributing Co. He was vice president and general manager of this company, which was reorganized to become the Great Lakes Foundry Sand Co. In 1941 Mr. Croneweth became chairman and Mr. Muhlitner rose to the presidency. He was a director of the National Industrial Sand Association and was prominent for many years in activities of the American Foundrymen's Association and the American Ceramic Society.

* * *

Allan E. Goodhue, vice president and a director of Chicago Pneumatic Tool Co., New York, died Apr. 20, following a short illness. Mr. Goodhue joined the company in 1939, and managed the company's interests in England until 1920, when he returned to the United States and was elected vice president in charge of sales.

* * *

Edward N. Greenleaf, 73, former Los Angeles district office manager for the Allis-Chalmers Mfg. Co., Milwaukee, died Apr. 10. Mr. Greenleaf joined the company in 1912 as a sales representative in the Salt Lake City, Utah, office. He was Los Angeles office manager from 1921 until he retired in 1947.

* * *

St. John E. McCormick, 71, president of the Rincon Foundry Co. and Central Iron Works, San Francisco, died Feb. 4. Mr. McCormick, a graduate of University of California, organized the Rincon Foundry Co. in 1903, and was its president from that time until his death.

* * *

G. A. Fritschi, 52, manager of the Pittsburgh sales district of the Vanadium Corp. of America, New York, died Apr. 13. Mr. Fritschi had been associated with the corporation since its incorporation in 1919, and with its predecessor, American Vanadium Co., since 1910.

* * *

William L. McCasky, 66, vice president and sales manager in Chicago for Tennessee Stove Works, Chattanooga, Tenn., died Apr. 16 in Davenport, Iowa, while on a business trip.

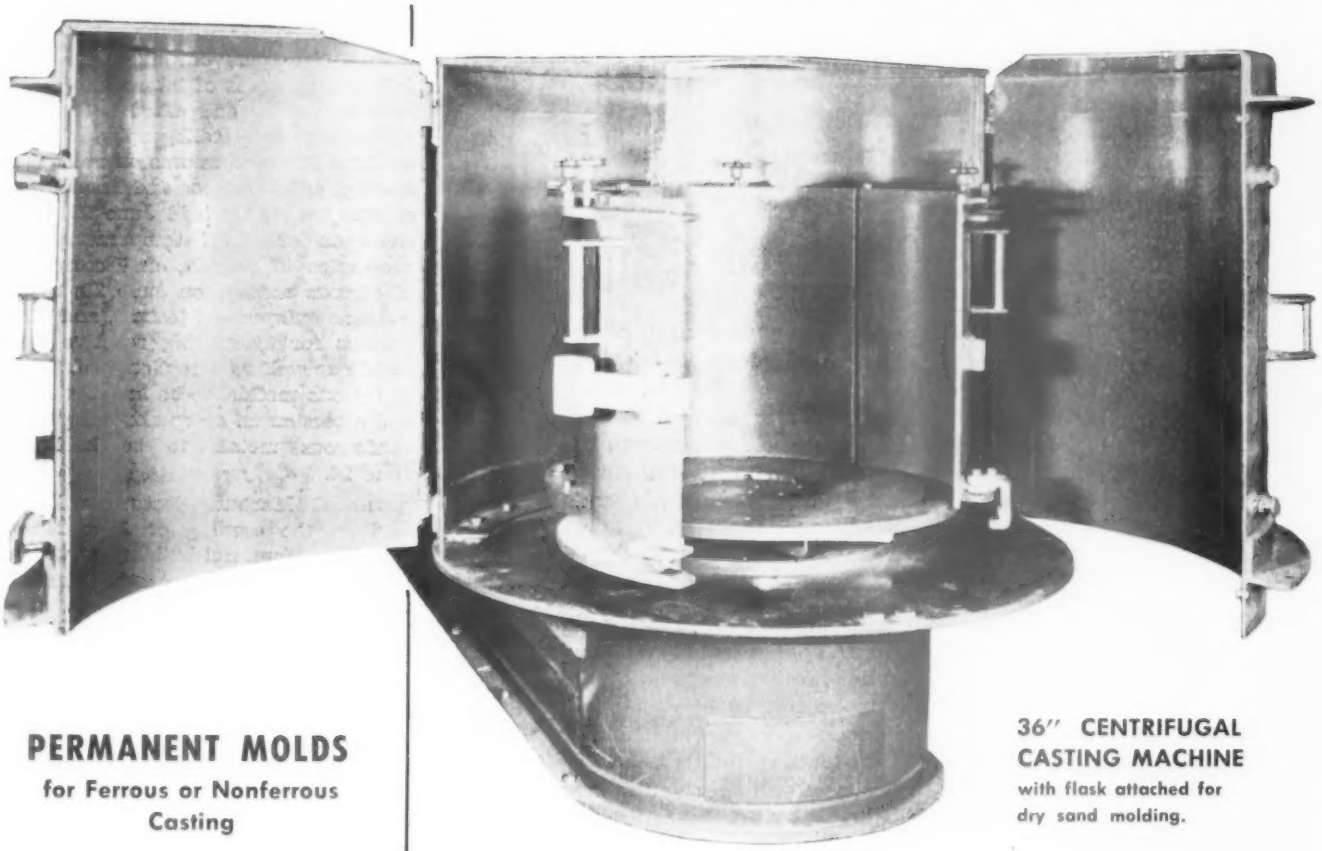
* * *

Alex Rankin, for the past year foundry superintendent, Niagara Engineering Co., Tonawanda, N. Y., died recently. Prior to that Mr. Rankin had been foundry superintendent, Lake Erie Engineering Corp., Buffalo.

* * *

Walter A. Woodliff, 88, foreman for Grinnell Corp., Atanta, until his retirement five years ago, died Apr. 12, at his home in Atlanta.

What is Your Casting Problem?
How Can AIMES Help You?



36" CENTRIFUGAL CASTING MACHINE
with flask attached for dry sand molding.

PERMANENT MOLDS
for Ferrous or Nonferrous Casting

●

PERMANENT MOLDS
for Pressure Casting

●

SPECIAL MOLDS
for Gravity Pouring

●

COMPLETE ENGINEERING SERVICES AVAILABLE

●

Investigate these casting machines designed in all combinations of speed, power and type best suited to meet your requirements. Vertical Centrifugal Casting machines are available with tables from 18 inches to 10 feet in diameter to handle castings up to 15 tons. Horizontal machines for pipes, tubes, sleeves, etc. We'll gladly submit recommendations—whether it involves a single machine or a completely engineered production layout.

AIMES COMPANY, INC.

2424 EUCLID AVENUE CLEVELAND 15, OHIO

SHEPARD
Newton's Law
Still Holds Good
Gravitation doesn't appear as a plant expense but it's a big factor in keeping costs up. Not even a feather will raise itself into working position, move sideways or deposit itself where needed. Human or steel muscles are needed to lift and move raw materials, semi-finished goods and finished products.
Where heavy loads are concerned, plant engineers don't depend on human muscles, but think in terms of a Shepard Niles overhead traveling crane. With a multitude of sizes and types available, there's bound to be one to fit your own needs — and a trained, experienced engineer of America's leading builder of overhead traveling cranes will help you select the one best fitted for your needs.
No matter what size or style Shepard Niles overhead traveling crane is selected to do your job, you can depend on sound design, rugged and precise construction, reserve capacity and economical, trouble-free operation year after year.
★ Shepard Niles engineers may feel an electric hoist is better fitted for your needs than an overhead traveling crane. Their recommendations are unbiased because Shepard Niles makes both. Only the type crane or hoist best suited for your job will be recommended.
Shepard-Niles
CRANE & HOIST CORPORATION
360 SCHUYLER AVENUE • MONTOUR FALLS, N. Y.

Plan Sessions For ASTM Meeting

American Society for Testing Materials has arranged 18 technical sessions for presentation of several extensive symposiums and numerous technical papers and reports at its 51st annual meeting which will be held in Detroit, June 21 to 25. In addition, over 300 meetings of technical committees will be held.

Tentative program indicates the following sessions of interest to those in the foundry and allied fields: A symposium on metallography in color on June 21; symposiums on magnetic testing, on usefulness and limitations of samples, to be held June 22; sessions on effect of temperature on properties of metals, and corrosion of ferrous metals, on June 23; symposiums on speed of testing, and procedures for identifying reactive materials as well as a session on fatigue of ferrous metals, to be held June 24, and a session on creep and fatigue of nonferrous metals to be held on June 25.

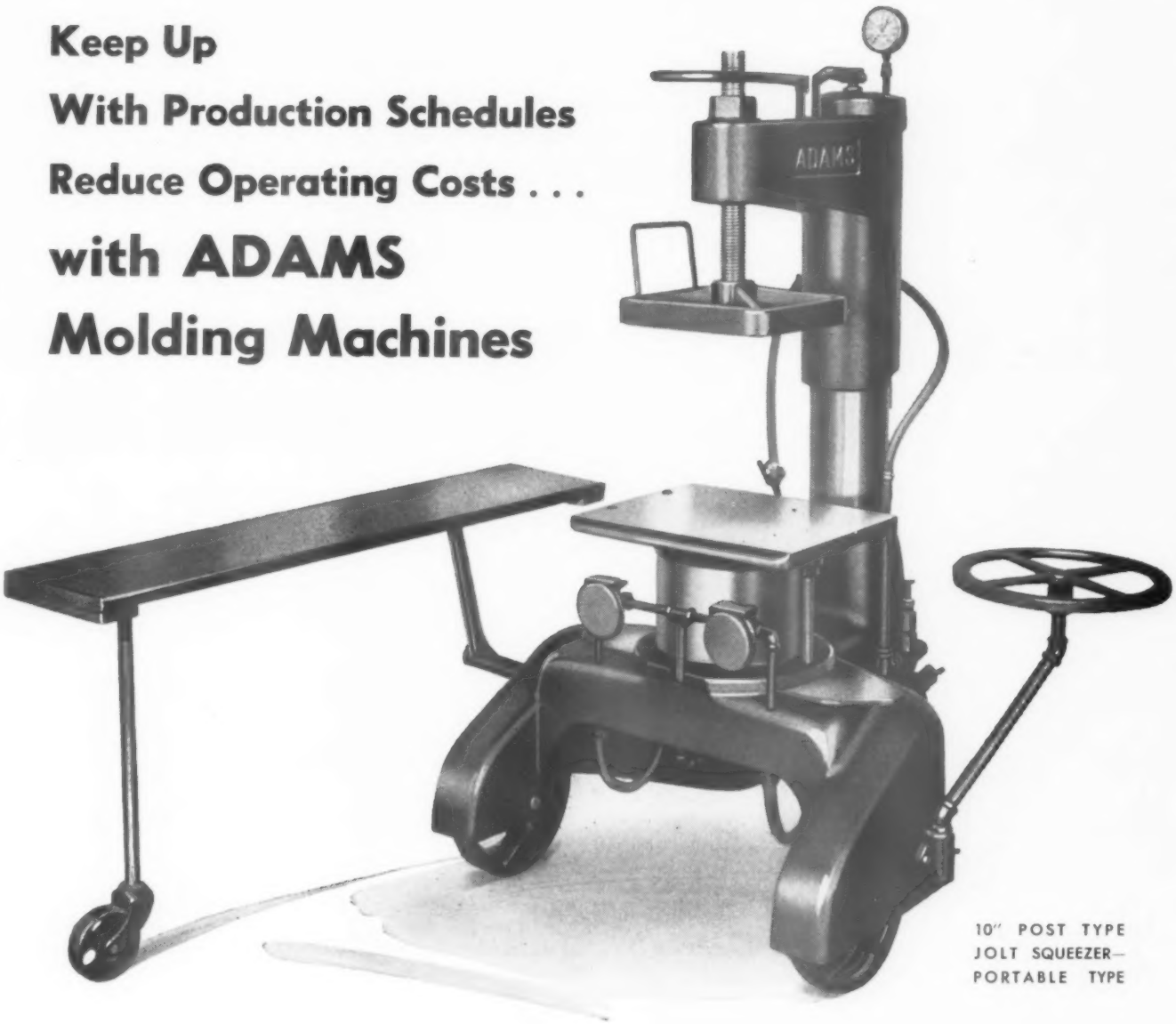
Annual Marburg lecture will be held on the evening of June 24 at Rackham Memorial building at which Dr. P. C. Aerbersold, Atomic Energy Commission, Oak Ridge, Tenn., will discuss "Isotopes and Their Application in the Field of Industrial Materials." A dinner will be held Wednesday evening, June 23.

Throughout the week of the meeting the society's eighth exhibit of testing apparatus and related equipment, and an interesting photographic display will be held. They will be located in the Book-Cadillac Hotel which will be the main registration headquarters. Auxiliary headquarters will be maintained at the Statler and Detroit-Leland hotels where committee meetings and some sessions will take place.

To Hold Symposium On Microscopy

Symposium emphasizing supplementary relationship between electron and light microscopy, and sponsored by Armour Research Foundation and Physics Department of Illinois Institute of Technology, will be held at Stevens Hotel, Chicago, June 10 to 12. Three-day session will cover instrumentation, techniques, and application of both electron and light microscopy. Papers will include those on applications of electron and light microscopy to metals, fine particles, biology, plastics, etc. as well as on phase microscopy, microtomy, shadow casting, and replica methods.

Keep Up With Production Schedules Reduce Operating Costs . . . with ADAMS Molding Machines



10" POST TYPE JOLT SQUEEZER—PORTABLE TYPE

All-out production—You'll get just that with Adams fast, accurate molding machines—and at lower costs! Their speed, stamina and power, plus simplified design for easy operation, help maintain steady, high output levels even with unskilled labor. Losses are limited by the close control of jolting and squeezing operations which assure accurate, uniform molds.

Here are some of the features that lower production costs—Minimum working parts, protected against sand and dust—convenient, accessible operating controls for quick handling—great flexibility—low maintenance costs. Adams molding machines give dependable, long term service. They stand up to the pressures of high production, maintaining their efficiency and accuracy throughout prolonged hard use.

SIZES AND TYPES FOR ANY SQUEEZE MOLDING REQUIREMENTS

Side Rod Type and Post Type—Jolt Squeeze and Jolt-Squeeze-Pattern-Draw-Styles—Stationary and Portable-Hand Squeezers. Write today for full details in Catalog No. 705. THE ADAMS COMPANY, 700 Foster St., Dubuque, Iowa

The ADAMS Company

ESTABLISHED 1883

DUBUQUE, IOWA, U.S.A.

MOLDING MACHINES and FLASK EQUIPMENT

STUDENTS AND FACULTY

View Foundry O

VOCATIONAL guidance counselors, foundry teachers and students of Cleveland district senior and junior high schools recently had the occasion to become better acquainted with employment opportunities in the foundry industry when they were taken on a tour of the Aluminum Co. of America's Cleveland Works. The visit on Apr. 15 was arranged through the co-operation of the company and Northeastern Ohio Chapter of the American Foundrymen's Association, and was one of a number of activities being conducted by the latter's Educational Committee to further public understanding of the foundry field's attractiveness as a vocation. Frank C. Cech, Cleveland Trade School, secretary of the chapter committee, was in charge of arrangements.

The tour included a preview of Alcoa's million dollar modernization program in its aluminum sand foundry, and inspection of the company's research laboratories and sales development division.

Guests totaling about 60 represented 25 different

Operations

schools and, in addition to faculty members, included representatives of the Cleveland Board of Education, student newspapers and student councils of a number of schools. Opportunity was provided the visitors to inspect the various operations conducted in the plant and laboratories and to become familiar with the many different types of work open to the prospective employee of a modern foundry.

The group was welcomed to the plant by Harold C. Erskine, works manager, who spoke at an introductory session which preceded a luncheon in the company cafeteria and the tour. Accompanying illustrations show some of the guests during their visit. Alcoa men in these views who assisted in explaining details of the operations include E. E. Stonebrook, metallurgist; M. W. Daugherty, assistant manager, research laboratories; Clarence Dumont, chief mechanical testing laboratory; Sherman Willard, industrial engineer; C. M. Tucker, head, radiographic laboratory.

TM ALLOY STEEL CHAIN—

MORE SAFETY

than meets the eye!

Here are the reasons why TM Alloy Steel Chain is so safe. It is fabricated from alloy steel bars... *made to Taylor's special formula.* It assures twice the safe working load of wrought iron or low-carbon steel chain. It's highly resistant to shock... to grain-growth and to work hardness at all temperatures. It's tough... Brinell Hardness Tests show 270 to 300. These are safety *facts* that cannot be overlooked!

TM Alloy Steel Chain never requires annealing. It stays on the job 5 to 15 times longer than ordinary chain (depending on the type of work). No wonder that it's the economical and *safe chain* it is. Contact your mill supply distributor or write the factory direct for prices and specifications.

S. G. TAYLOR CHAIN CO., Dept. S-6, Box 509, Hammond, Indiana

"THE BEST BY TEST SINCE 1873."

TAYLOR MADE ALLOY Chain

SCREWBALL IDEAS SOMETIMES WORK IN THE FOUNDRY

(*Continued from page* 91)

is a scheme that works backward from most accepted foundry practice. We are using asbestos in our molding sands.

This idea was developed during the production of bronze cylinder castings. The asbestos was added in the form of a material known as lagging. Actually, the asbestos lagging is granulated asbestos, probably mixed with a certain amount of fire clay.

The asbestos was added to the sand for the purpose of keeping the metal liquid longer by taking away the chilling effect of green sand, at least to a certain extent. The bronze castings in question were cylinders about 14-in. diameter, but the wall thickness was only ½-in. The entire mold was green sand. Heavy ribs on the inside were faced by cast iron chills.

Reduced Shrinkage Troubles

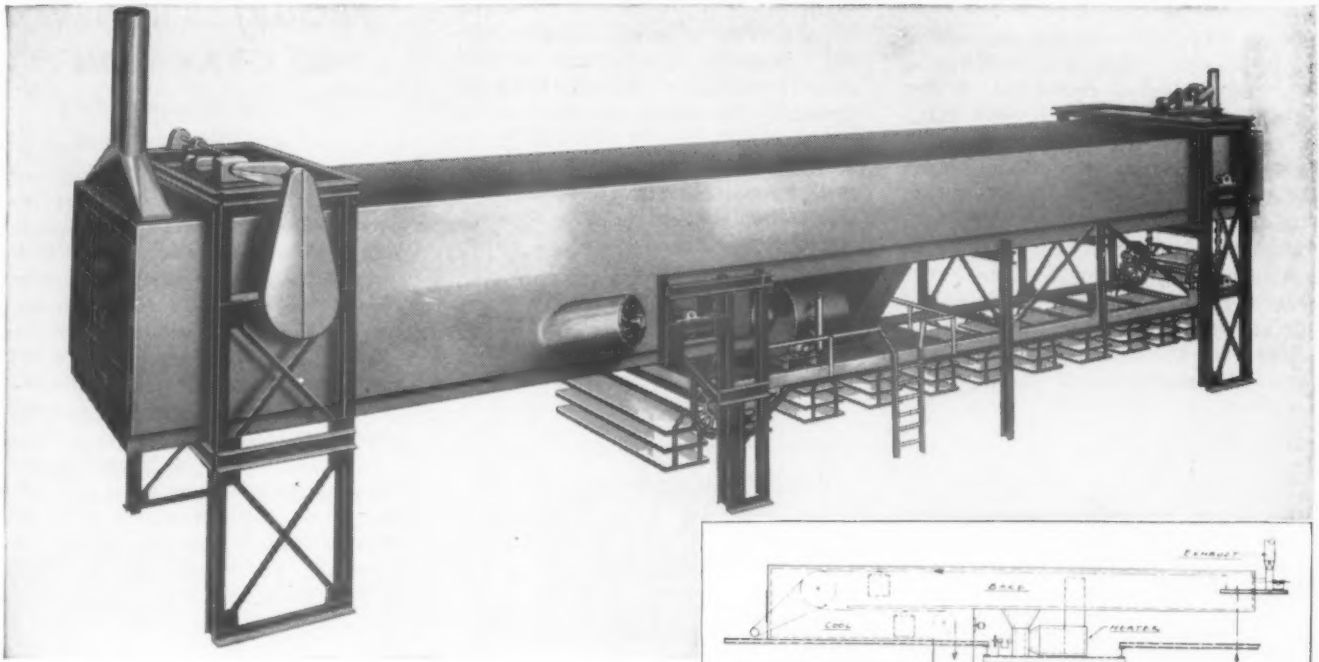
Main defect in these castings was shrinkage. The castings were machined on the outside, and slots were cut entirely through the inside to the ribs. The casting became a series of thin rings 14-in. in diameter, held together and spaced by the ribs.

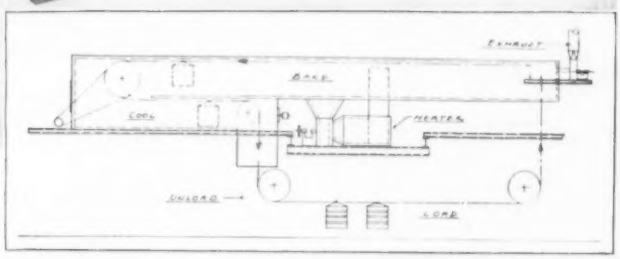
Shrinkage appeared on some of these castings as a large crack. It looked as if the metal chilled fast on the outside and fast on the inside, while the center, not being able to received proper feeding, opened up into a crack. We then added the asbestos to the sand.

Our loss has been considerably less, and we believe that we are well on the track of completely eliminating the trouble by good foundry practice. But even more amazing than the insulating property of the asbestos are the other properties that we gained by using this material.

We mixed about 5 per cent by weight or 10 per cent by volume of this material to a local sand which, by the way, ordinarily *ain't so hot.* This local sand has very poor refractory properties, and it scabs and burns out unless new sands and clays are added constantly. Practically every flat surfaced mold had to be skin dried. Many other castings that were poured hot would scab unless the molds were skin dried. After the asbestos addition, we were able to make almost any casting in our shop without drying. To date, we have had no scabs since using this

(*Concluded on page* 240)





The time-saving, space-saving, compact design of this new Horizontal Core Oven is characteristic of Young Brothers' Engineering. Into it went the skill and confidence of many years of experience . . . also a thorough knowledge of the job to be done and the production problems involved.

This new core oven can be installed in practically any building without making any major structural changes.

The coremakers are located right next to the oven so that they can load the cores directly on the moving racks thus eliminating the necessity of transporting them on hand trucks or a conveyor from the core room. The location of the coremakers, at the oven, also saves core room space.

The size of the loading racks can be varied and the shelves can be adjusted to accommodate cores of many sizes and shapes.

Besides allowing for the removal of exhaust gases at the point of greatest concentration, the new oven design provides an effective cooling zone for the cores and assures comfortable working conditions for the coremakers.

This New Horizontal Core Oven is Young Brothers' answer to the demand for better core baking equipment. It is YOUR answer to the need for lower production costs and higher operating efficiency.

New HORIZONTAL CORE OVEN . . . . .

offers many cost saving advantages!

MANUFACTURERS ASSOCIATION, INC. FOUNDRY EQUIPMENT

MEMBER

YOUNG BROTHERS COMPANY

6508 MACK AVENUE DETROIT 7, MICHIGAN

YBCo

ESTABLISHED IN 1896

(*Concluded from page* 238)

sand. Also, the surface appearance is improved. There is no burning in, and the surface is equivalent to that produced by a No. 0 Albany sand.

Other properties also are good. Permeabiilty and strength are equivalent to No. 2 Albany sand, tested by the same equipment. And then, also, the fact that the asbestos is an insulating material means that there should be less misruns and greater feeding ability.

So far, our investigations are in the early stages and we do not know the reaction with iron or steel but, from several week's use and inspiring results, we believe that we have made a valuable contribution to the operating technique of the foundry industry.

Are you a screwball foundryman? Maybe some of yours ideas will work. Don't dismiss them as being too foolish.

Aluminum Permanent Mold Co., 4401 Hamilton Ave., Cleveland, has been incorporated to manufacture aluminum permanent mold castings.

Ajax phosphor copper,

like all Ajax alloys, is produced under rigid laboratory standards to constant formulae. In relation to total cost, Ajax alloys give greater performance. No product can do more . . . so protect your quality work with Ajax alloys

AJAX METAL CO., PHILADELPHIA 23, PA.

ASSOCIATE COMPANIES: AJAX ELECTRIC • AJAX ELECTROTHERMIC CORP. • AJAX ELECTRIC FURNACE • AJAX ENGINEERING

PROGRESS REVIEW OF GRAY IRON

(*Continued from page* 101)

sentially 3.30 per cent T. C., 1.90 per cent Si, 0.75 per cent Mn, 1.0 per cent Cu, and the effects of transverse strength, deflection, resilience, and impact were noted. As a result of these tests the suggested limiting percentages for each of the foreign elements are: Lead—0.005 or less; cadmium —0.005; bismuth, tellurium — 0.001; antimony, arsenic, tin, zinc—0.01; beryllium — indefinite, but probably above 0.02; aluminum—0.1.

With the intent of improving mechanical properties of gray and alloy cast irons through the use of isothermal heat treatments, Nayler and Dowdell[10], developed "S" or "TTT" curves for a base iron with a nominal composition of 3.00 per cent C, 1.90 per cent Si, 0.75 per cent Mn, 0.22 per cent P, 0.07 per cent S, and molybdenum varying from 0.00 to 0.50 per cent. In the course of these experiments it was found that the addition of molybdenum in varying amounts up to 0.50 per cent had little if any effect on isothermal transformation rates or hardenability between 400°F and 700°F. From 700°F up to lower critical, molybdenum additions retard transformation rates. The isothermal transformation curve for cast iron is not the typical *S* curve as formerly postulated, but is a series of *S* curves. Fig. 5 illustrates the curves developed by their experiments.

The thermodynamic principles of slag and gas reactions in the cupola were reviewed in THE FOUNDRY by Somers and Gunther[11]. Hydrogen may be picked up from moisture in the cupola or in green sand molds and is evolved by the solidifying iron. Bleeding or purging, and gas holes are evidence of presence of hydrogen. High silicon contents tend to increase the tendency for hydrogen absorption but reduce the oxygen.

Microstructure—The microstructure of gray iron castings is the most reliable indication of the physical properties to be expected. One of the distinguishing microconstituents of gray cast iron is graphite, the size, shape, and distribution of which largely determines the resulting properties. For a thorough understanding of photomicrographs, one must appreciate the significance of the various microconstituents. With this in mind, R. W. Lindsay recently composed a thorough summary of the "Graphite Phase in Gray Cast Iron"[12]. This paper reviews the factors affecting the formation of the various types of graphite and their influence

on the physical properties. The following tabulations are taken from this report:

Some Factors Promoting Graphite Formation

1. Slower cooling rate.
2. Increased total carbon.
3. Increased silicon.
4. Presence of graphitizing elements such as nickel, aluminum, titanium, zirconium and copper.
5. Absence of carbide stabilizing elements such as chromium, vanadium, and in lesser degree, manganese and molybdenum.

Effect of Undercooling During Solidification Upon the Graphite Pattern in a Gray Iron (2.78% C, 1.5% Si) (Adapted from Schneidewind & D'Amico)

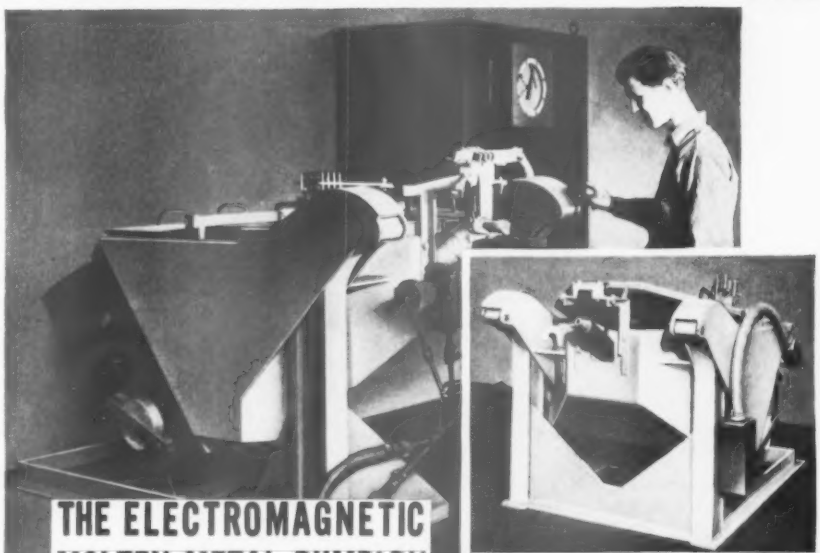
Apparent Solidus Temperature °F	Type of Structure
2060	Gray iron, normal flake structure, Type A
2040	Gray iron, normal flake structure, Type A
1992	Gray iron. Some short flake graphite. Some eutectiform - graphite in dendritic dispersion. Type A & Type D.
1970	Gray iron. Eutectiform-graphite in very dendritic dispersion, Types D & E.
1955	Mottled iron. Carbides plus eutectiform-graphite.
1818	White iron. Traces of graphite and some temper carbon formed during cooling.

The three-dimensional appearance of graphite has always offered a challenge to the metallurgist's imagination and ingenuity. By using Roll's tedious method of photographing and repolishing the same area many times, MacKenzie[13] constructed some excellent space models of graphite. Another approach to the study of graphite was revealed in "Microradiography of Gray Cast Iron" by Salkovitz, Schaum and Von Batchelder[14]. In microradiography, x-rays from an industrial type, tungsten target tube, are directed through a cast iron specimen, approximately 0.005-in. thick, onto a fine-grained sensitive film which is then developed and examined under high magnification. The difference between x-ray absorption coefficients of graphite and the iron matrix distinguish them from one another and variation in densities of the individual flakes reveal their depth.

Fig. 3 shows a conventional photomicrograph of a gray iron specimen at 100 diameters and a microradiograph of the same specimen at 20 diameters. From comparisons of specimens with various types of graphite the authors were able to conclude that microradiography shows graphite to be actually wider, longer, more uniform in shape, and more abundant than revealed in photomicrographs; also that AFA Types *D* and *E* graphite lies between the arms of the dendrites and clearly outline them.

Undoubtedly the most important gray iron research effort reported in 1947 was that of Morrogh[15] at the British Cast Iron Research Institute. As the result of many years of work he and his associates devised a technique for consistently producing nodular graphite in gray iron without any heat treatment. Irons with this nodular graphite structure have tensile strengths almost double those of the same iron containing flake graphite. The iron is essentially "self-malleabilizing," solidifying white and then decomposing to a mixture of gamma iron and temper carbon. The metallurgy of such a process requires the forma-

A *New* NON MECHANICAL METHOD FOR CONTROLLED PUMPING OF MOLTEN METAL

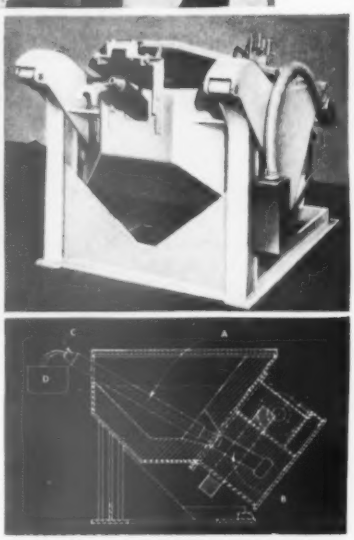


THE ELECTROMAGNETIC MOLTEN METAL PUMP* BY AJAX

Here is a device for the precise control of the flow of molten metals like aluminum, zinc or brass. It can be used to mechanize operations where today a hand ladle, a tapping spout, a tilting equipment or a siphon is used.

The electromagnetic pressure created by the high current in the loop of an Ajax Twin Coil Induction Unit is utilized to control and channel the metal stream in one direction; it lifts pure metal from the bottom of the hearth through an electrically heated refractory pipe over the metal level to its destination. The electric current alone controls the flow.

Castings ranging from ¼ lb. to 30 lbs. or more can be poured in endless repetition with good accuracy in weight. Special problems requiring a continuous flow of hundreds of pounds per minute can be handled by the same unit. The electromagnetic pump is also a molten metal reservoir maintaining metal temperature accurately.



The large photo shows the Ajax-Tama Electromagnetic Pump at work. Control cubicle in rear maintains temperature, energizes pump from electric timer, electric eye, or similar devices. Second photo is a close-up of the pumping unit. Below is a cross section of unit showing discharge pipe (A), induction channel where pressure is created (B), pouring spout (C), and mold (D).

Ask AJAX for more information.

*Patents applied for and allowed.

AJAX ENGINEERING CORPORATION
Trenton 7, N.J.

AJAX TAMA-WYATT INDUCTION MELTING FURNACE

Associate Companies: AJAX METAL COMPANY, Non-Ferrous Ingot Metals and Alloys for Foundry Use
AJAX ELECTROTHERMIC CORP., Ajax-Northrup High Frequency Induction Furnaces
AJAX ELECTRIC CO., INC., The Ajax-Hultgren Electric Salt Bath Furnace
AJAX ELECTRIC FURNACE CORP., Ajax-Wyatt Induction Furnaces for Melting

tion of a carbide, stable at the solidifying temperature but unstable at lower temperatures.

The reaction $FeS + Mn \underset{\text{high temp}}{\overset{\text{low temp}}{\rightleftharpoons}} MnS + Fe$ satisfied this requirement. With the proper S and Mn ratio, sufficient FeS will be present to form white iron at the time of solidification. As the temperature drops the tendency to form MnS increases. The resulting decomposition of the FeS enables the Fe_3C to graphitize automatically. A strong inoculant must also be added to the iron to provide a large number of nuclei for the formation of the spherulitic graphite. Varying degrees of success were obtained by inoculating with combinations of Ca, Si, Mg, Ba, and Sr. The perfected technique is now being adapted to the production of a large commercial foundry in England and patent applications have been filed in this country and abroad.

Although the inaccuracies of the Maurer diagram have long been criticized and augmented by new gray iron foundry practice, it was only recently that a new structural diagram was developed, by H. Laplanche[16] in France. His diagram, shown in Fig. 4, offers considerable improvement over the Maurer diagram in that it more accurately relates the final microstructures for the complete range of carbon equivalents encountered in cast iron analyses. Using the formula $K = 4.3\ Si\ (1 - \frac{5}{3C+Si})$, a series of curves was constructed for different value of K. All irons with compositions which place them on the same K line have equal graphitizing tendency and will have the same structure if their cooling rates are the same. This working diagram offers more potential use to the operating foundryman than its predecessor although it still does not adjust for the powerful influence of inoculation.

Although there have been many metallographic studies of gray cast iron, only relatively few such investigations have been conducted on pig iron. For this reason Schneidewind and Harmon entered upon a study of the "Microstructure of Silvery Pig Iron."[17] This type of pig iron contains approximately 10 per cent silicon and 2 per cent carbon and presented an initial problem of developing a good etching reagent. The best results were finally obtained by using the following solution at 180-200° F for 10-30 seconds: 22 cc of concentrated nitric acid, 80 cc of saturated sodium nitrate in water, 1-2 grams of potassium persulphate.

This etch revealed a one-phase matrix of alpha silico-ferrite, the grains of which may be either large equi-axed or, due to internal forces, elongated parallel subgrains or twins. In order to study the distribution of steadite in the pig iron, the investigators developed another new etch which deposits an adherent bluish-black film of metallic arsenic on the ferrite and leaves the phosphides white. This etch can be used at room temperature and is prepared as follows: Digest 0.5 gram of arsenious acid (As_2O_3) in 5 cc of concentrated nitric acid until copious fumes of nitric oxide (NO_2) are evolved. Add 25 cc of water, 5 cc of concentrated nitric acid, 1 gram of potassium persulphate, and one drop of pyridine.

Sand—Since a great majority of casting defects arise from improper sand mixtures or molding techniques, articles on the subject of sand always merit considerable attention from the foundrymen. In 1947 the Lynchburg Foundry Co. announced success in

(*Continued on page* 244)

TRANSITE CORE PLATES are lighter, stronger, resist warpage.

● Core makers can handle more Transite* Core Plates at one time, thus make fewer trips. That means faster production with less fatigue and fewer accidents. Transite Core Plates offer all these advantages:

They Last Longer—Made of fibrous asbestos and cement, Transite Core Plates resist shock . . . are less likely to crack or break.

They Clean Easily—Core wash, sand, etc., do not stick as readily to other materials. Both sides are usable.

They resist Corrosion and Warpage—Transite Core Plate surfaces stay smooth even after long service. Warpage is less than 0.1%.

They are Economical—Low price, low maintenance and long life add up to low cost.

To eliminate green cores and reduce baking time perforated plates are also available.

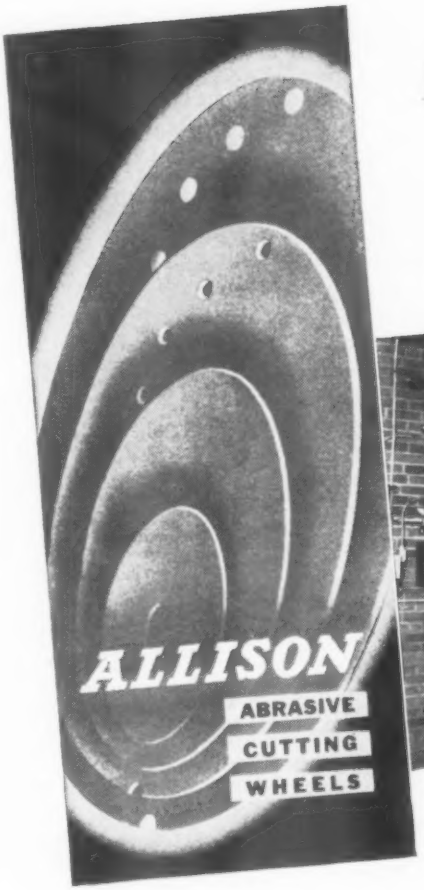
For full details, write Johns-Manville, Box 290, New York 16, New York.

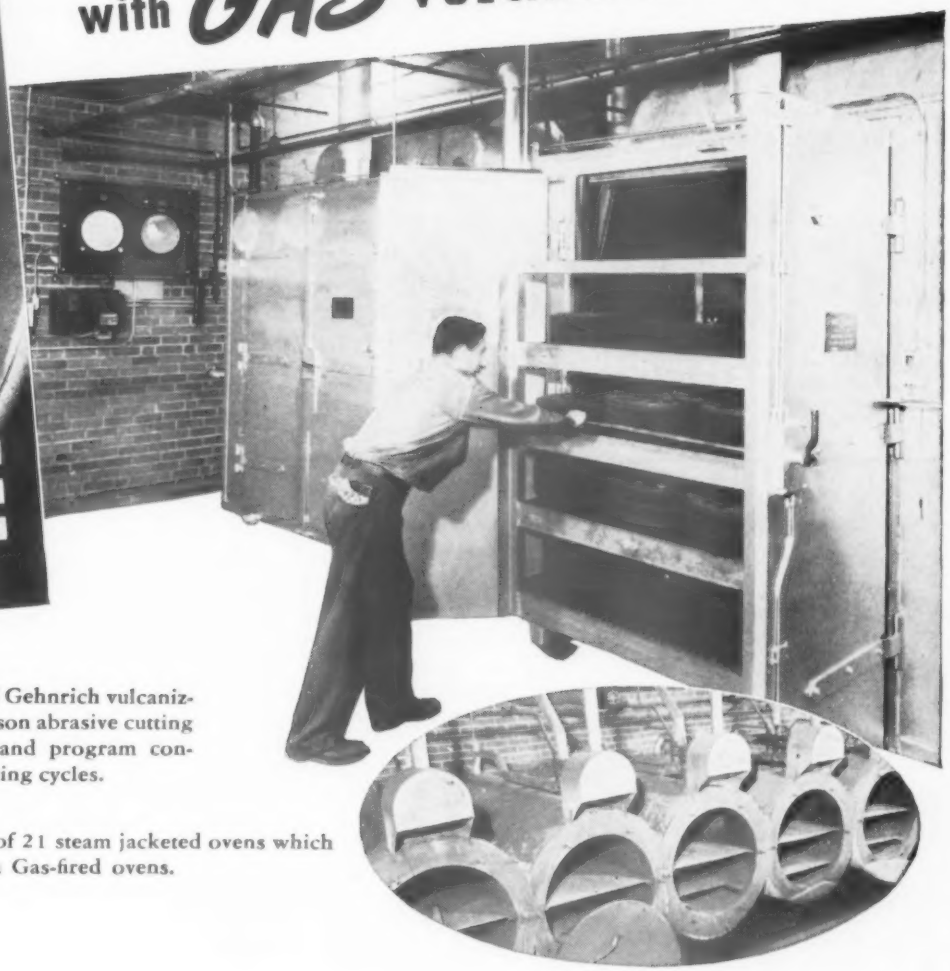
JM PRODUCT

*Reg. U. S. Pat. Off.

Johns-Manville **TRANSITE CORE PLATES MADE OF ASBESTOS**

HEAT PROCESSING COSTS REDUCED 75% with GAS VULCANIZING OVENS





Charging one of the five Gas-fired Gehnrich vulcanizing ovens with a truckload of Allison abrasive cutting wheels. Note Bristol recorder and program controller which govern heat processing cycles.

Part of the battery of 21 steam jacketed ovens which were replaced with Gas-fired ovens.

COST REDUCTION is only one of the advantages in the use of GAS for heat processing at The Allison Company, Bridgeport, Connecticut.

In fact, the conversion to modern GAS Vulcanizing Ovens resulted in the following important operating and product advantages, as well as in cost reduction:

- **Improvement in the uniformity of the product**
- **Extension of research facilities to production basis due to accurate heat control**
- **Elimination of maintenance on steam piping and oven jackets**
- **Reduction in handling expense**

Allison Abrasive Cutting Wheels are high-speed production tools made by bonding sharp abrasive cutting grains in discs with a vulcanized rubber adhesive. In that vulcanizing process GAS performs its vital function—supplies heat at the precise temperature and for the exact length of time required for perfect bonding.

Accurate temperature regulators and simple, time-cycle program controls, have eliminated the human element in the vulcanizing process—have convinced Allison Company executives that GAS, and modern Gas Equipment, really team-up to provide economical, dependable heat processing. Wherever you use heat in production processes there's a place for GAS; your local Gas Company Representative can assist you in applying modern Gas Equipment.

AMERICAN GAS ASSOCIATION
420 LEXINGTON AVENUE, NEW YORK 17, N. Y.

(*Continued from page* 242)
adapting a chemically bonded molding sand to their extensive operations. T. W. Curry wrote an interesting account[18] of the physical characteristics of this new sand mixture and the problems inherent with using it in mass production. The chemical bond—called Westonite—is a high-carbon resin material which is dissolved in a solvent and water. After mixing sand and bond, it is passed through a drier at 300-350° F to evaporate solvent and water and set the chemical coating on the grain. The individual sand grains then have a hard durable coating which is insoluble in water. Introduction of a solvent in subsequent mixing operations makes the coating plastic so that the sand then has excellent molding properties. In comparison with conventional sand some of the advantages claimed for the chemically treated sand are:

1. Finer sand, with a lower moisture content, can be used; no special facing sand required and yet the casting surface is cleaner and smoother.
2. Mulling time is shorter; increased flowability and toughness reduce molding time; sand peels readily so as to minimize cleaning operations.
3. Same sand can be used for all sizes of castings.

Going to a greater extreme in chemically bonded sand, Croning[19] patented a molding material comprised of 92 to 94 per cent high-purity silica sand and 6 to 8 per cent plastic binder containing 90 per cent phenol resin and 10 per cent hexamethylene-tetramine. A metal pattern plate is heated to 180-200° C, sprayed with paraffin, and clamped over a box containing the sand mixture. The box is inverted so that the sand falls on the pattern and adjusts itself to the shape. The plastic bond softens and forms a continuous coating over the surface within six seconds. The box is inverted and the excess molding material falls away from pattern surface to be used for succeeding molds. The pattern plate with the thin adhering coating is heated in an oven at 300° C for 2 or 3 minutes, removed, and the hard bakelite-sand shell which has formed is lifted from the pattern. Two mold halves are so made and pasted together. The finished mold is placed in a flask with suitable backing, steel shot, sand, etc., gates and risers attached, and metal poured into it.

Castings Are Clear

Iron, steel and aluminum castings have been made in this molding material without any burning or sticking and, consequently, with no cleaning required. It is claimed that very thin and intricate shapes can be precision cast with ease in this material.

Sand is a material common to foundries melting all types of metals and therefore much of the research has application throughout the entire foundry industry. An example of such an investigation with broad applications is that of G. R. Gardner—"Physical Properties of Molding Sands."[20] The author, realizing the difficulties arising from constantly changing moisture contents of the sand mixtures in the foundry, constructed reference curves which were used to predict rapidly and accurately the physical properties of the sand in the foundry at any time. For any one sand mixture, the moisture and number of rammer blows (with standard AFA sand rammer) are varied and the surface hardness, green tensile strength, green compressive strength, permeability, deformation, and apparent density are measured

(*Continued on page* 246)

Electro-Magnetic Separators VERSUS

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DON'T BE MISLED ! ! !

Permanent Magnets have been improved—yes, but they will never be a substitute for a well designed electrically energized magnetic separator for removing dangerous tramp iron from ALL MATERIALS under ALL CONDITIONS.

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We cannot jeopardize our reputation as the foremost manufacturers of magnetic separation equipment by recommending permanent magnets for general applications.

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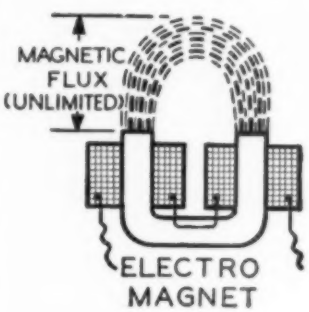

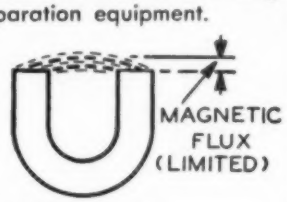

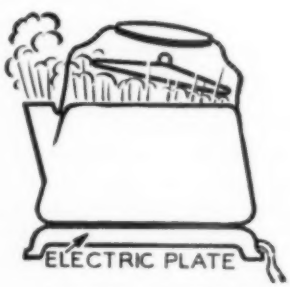

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When the Series 18 Atmospheric Regulator is used, both premix and non-premix systems are assured proportional air-gas ratios over the entire capacity range of the regulator.

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GAS or OIL COMBUSTION EQUIPMENT • OFFICES in PRINCIPAL CITIES
CLEVELAND 5, OHIO

(*Continued from page 244*)
and plotted in the manner shown in Fig. 6.

With these graphs constructed, a moisture determination of the sand may be made just prior to making the mold, and surface hardness determinations made at any desired location in the mold. The point of intersection on the hardness graph determines a reference point which, when applied to the graphs of the other properties, provide an estimate of permeability, strength, etc., at the location of the mold under examination. Thus, the foundryman has a rapid on the spot nondestructive test for sand properties.

Miscellaneous—Some of the important cast iron work published in 1947 does not fall into any of these larger classifications and will be reviewed in this section.

After a long period of silence necessitated by the war, Piwowarsky announced some of his metallurgical activities in Germany. For example, some rather spectacular physical properties were developed by hot rolling cast iron.[21] To be amenable to rolling, the cast iron must have an as-cast white structure obtained either through rapid cooling rate and/or proper composition. The phosphorus content should be kept low and the rolling temperature held in the range of 1740-1830° F. The temperature of the last pass is most important in determining the final physical properties.

By hot rolling an iron containing essentially 2.9 per cent C, 1.3 per cent Si, 0.1 per cent P, its tensile strength increased from 39,800 psi before rolling to 156,400 psi after; shear strength from 52,600 psi to 108,800 psi, and elongation from 0.33 per cent to 2 per cent. Rolled cast iron has been used for machine, bridge, ship, and railroad construction as well as piston rings and cylinder liners.

Of interest also was a 5-7 per cent silicon cast iron capable of withstanding oxidizing atmospheres as high as 1740° F[22]. It is important that this alloy be cooled to a definite temperature to allow gases to escape before pouring.

Foreign Cupola Designs

Several unique cupola designs were revealed by Piwowarsky[23]. In order to tap hotter iron, the author designed separately fired recuperators to generate a hot blast with a temperature between 660-1200° F. Another design obtained superheating by surrounding the well of the cupola with a low frequency induction coil. A third innovation made use of an auxiliary shaft, alongside the cupola, in which hot CO was generated from coke and passed into the cupola where it was burned to CO_2, melting the iron.

Differing markedly from cupolas operating in the United States is the "Slagging Gas Producer for Melting Foundry Iron"[23] described by Laplanche. Several such units are reported to be functioning satisfactorily in France, one since 1934. Fig. 2 shows a typical plant layout. The raw materials — scrap, iron, steel, coke, coal, and limestone—are dumped into charging bell *N* of the gas-producer cupola *C*. The cupola is lined with a water-cooled alloy steel cylinder, which is automatically coated by solidifying slag. The cupola is blown with a preheated blast originating at blower *L*, passing through heaters *J* and *J*, through main *P*, bustle *B*, and water-cooled tuyeres *M* and *M* where the blast temperature is approximately 900-1000° F. Top gases pass off through a dust collector *G*, through the firebox *F*, to the two air preheaters *J*

(*Continued on page 248*)

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simple, fast

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PLUGS INTO
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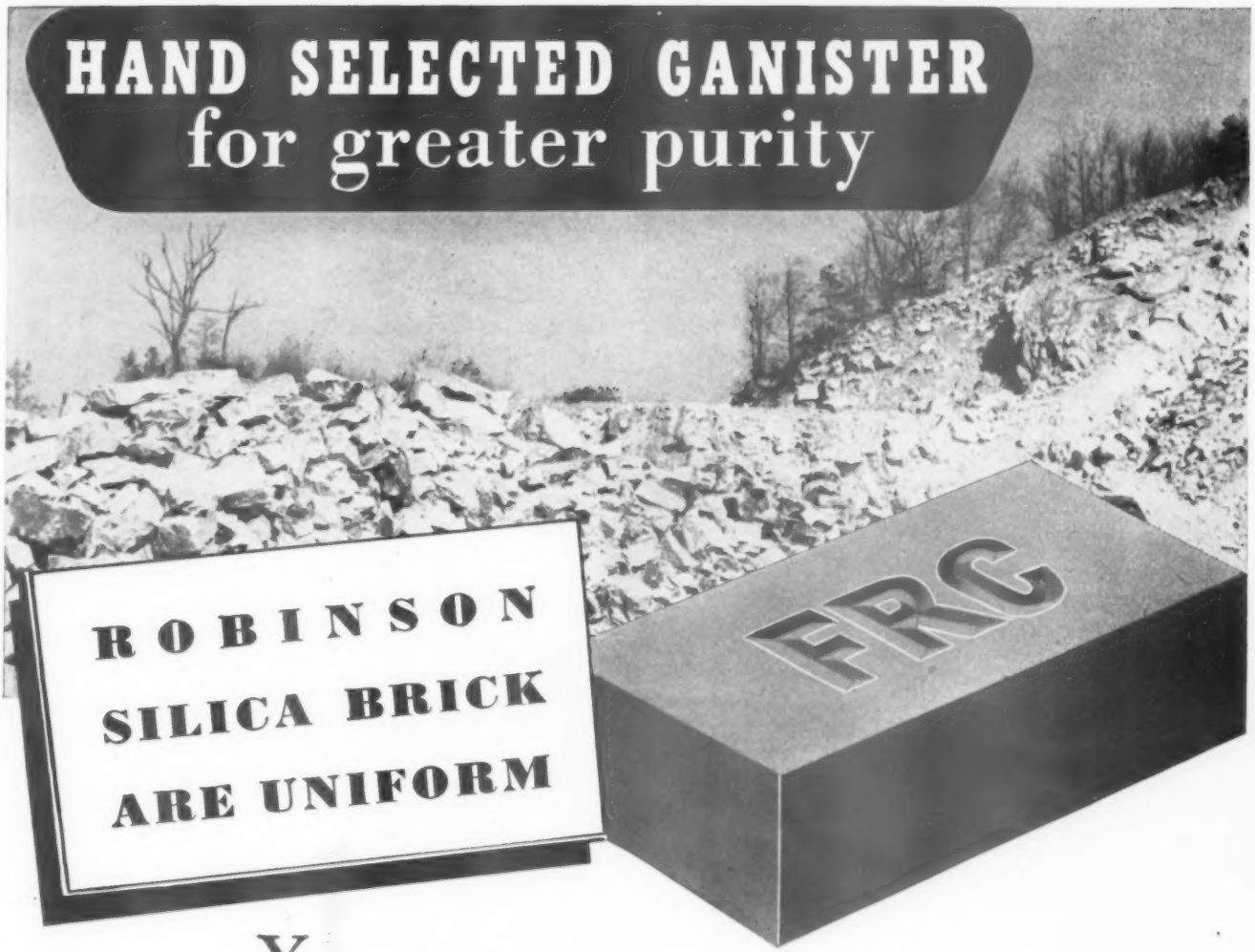

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(*Continued from page* 248)

and *J*, and are discharged out chimney *K*. The cast iron made in this type of cupola has carbon as low as 2.5 per cent, silicon down to 0.2 per cent, very low sulphur, and may be tapped as hot as 3300° F.

In this country the inability of the foundry industry to obtain an ample supply of good quality coke prompted a timely paper on the use of "Anthracite as Cupola Fuel" by C. C. Wright[21]. By way of history it is interesting to note that anthracite coal was the principal cupola fuel during the 50 years previous to 1900. In these current tests comparing cupola operations with egg size coke vs egg size anthracite, it was found that in the case of the latter the oxygen was consumed much closer to the tuyeres, the zone of maximum CO_2, and therefore the maximum temperature regions were closer to the tuyeres, and the CO_2 was reduced to CO more rapidly.

For this reason, there would be some advantage in using larger sized anthracite which would spread the reaction zone, permit greater penetration of oxygen, and increase the temperature at the center of the cupola. Higher blast rates were also recommended. The melting rates and tapping temperatures compare favorably for both types of fuel. In adopting anthracite to cupola operations, the author recommended introducing from 25-35 per cent anthracite in the last ten splits and increasing the number of anthracite-coke splits in multiples of ten until all splits contain anthracite. After establishing slagging and blast procedures for this type of operation, the percentage of anthracite in the splits can be increased.

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Buckeye Silica Firestone's high resistance to heat and abrasion results in much longer life for linings and patches in the melting zone of cupolas.
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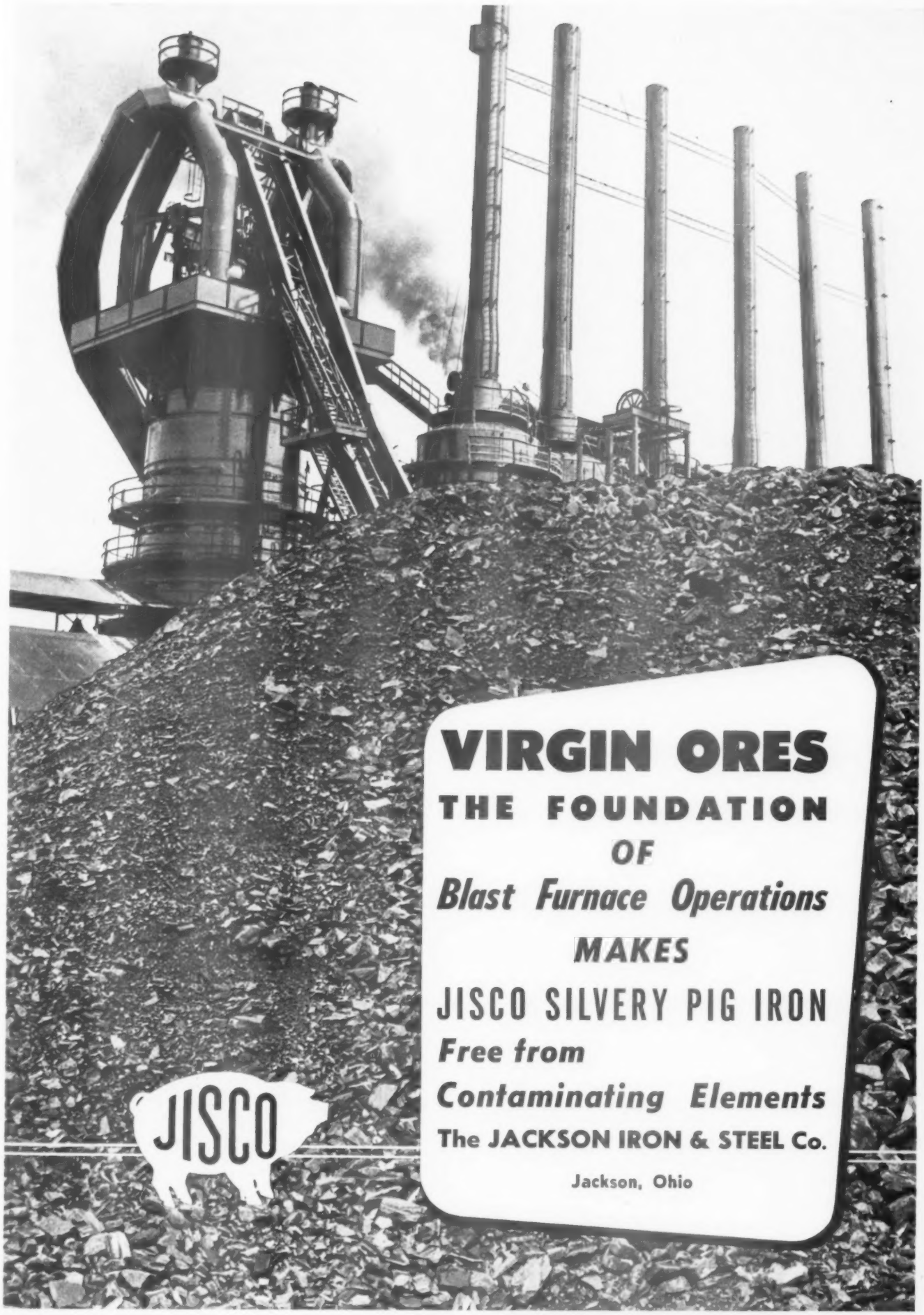
Weld Cast Iron

Although most foundrymen are reluctant to talk about their bad castings which must be scrapped, welding is a useful correction technique which can be employed to reclaim many of the castings destined for the scrap pile. The weld repair experiences and practices of one of the largest gray iron foundries in the world, Ford Motor Co., were related by W. J. Pfander in an article entitled "Cast Iron Weld Repair Methods"[22]. Such defects as surface inclusions of sand or slag, scabs, cold metal misruns, crushes, cold shuts, cracks, breaking in of gates and chipping breaks may be repaired by several methods.

Castings to be welded by oxyacetylene are preheated to 1100° F in a furnace, welded with a rod analyzing 3.35-3.55 per cent C, 2.60-3.00 per cent Si, 0.40-0.60 per cent P, 0.60 per cent Mn, 0.10 per cent S, and before the temperature drops below 700° F, they are returned to a post-heating furnace at 1050° F for slow cooling to 550° F followed by air cooling. Where expansion and contraction of the repair area are not restricted, the heat treatment is omitted. Metallic arc welding, with nickel, copper, and nickel-copper types of electrodes, is used for minor repairs. Leaky areas caused by spongy metal are sealed by spraying first with commercially pure copper followed by low carbon steel. Today all foundries large and small must recognize that welding has of necessity become an important part of production operations and every effort made to improve and develop its application.

In the interest of brevity, it will only be possible to mention several outstanding articles published during the year. For an excellent description of a large variety of special physical tests for cast iron, one should read James S. Vanick's article[23]. T. E. Eagan, winner of one of the

(*Concluded on page* 250)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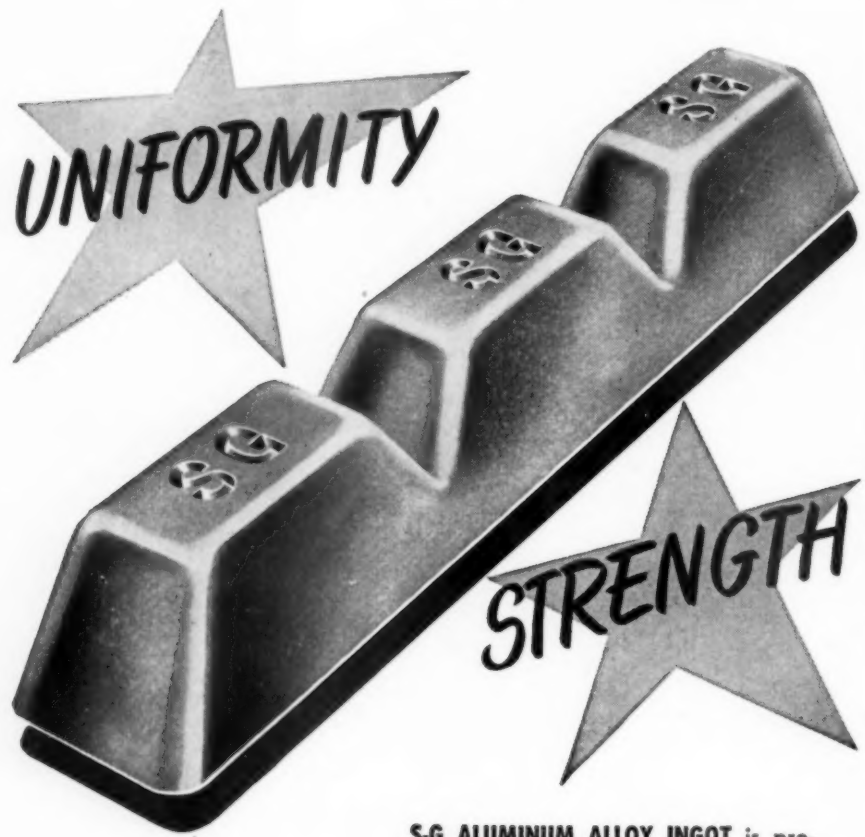
(*Concluded from page 218*)

1947 *Materials and Methods* Achievement Awards, explained to members of the American Society of Tool Engineers and American Foundrymen's Association "When and How to Use Cast Iron"[27]. Contained therein are a number of interesting comparisons of physical properties of various types of cast irons with steel.

Contradicting the long standing empirical assumption that iron is more corrosion resistant than steel, salt spray, SO_2 fume, water vapor, acid fume, and weatherometer tests, made by R. W. White[28], Westinghouse Electric Corp., proved bare steel and cast iron equally resistant. Flinn wrote a timely article on "Casting Design"[29] in which he illustrated the stress-strain characteristics of cast iron and their significance in the design and production of serviceable castings.

Conclusion—This summary reviews the most significant metallurgical developments which have advanced the knowledge of cast iron during 1947. Cast iron research activities are becoming more correlated now that the various societies are co-operating in a nation-wide educational program in a number of engineering colleges. The American Foundrymen's Association is currently sponsoring a survey of foundrymen to determine those problems which are most deserving of research efforts and financial assistance



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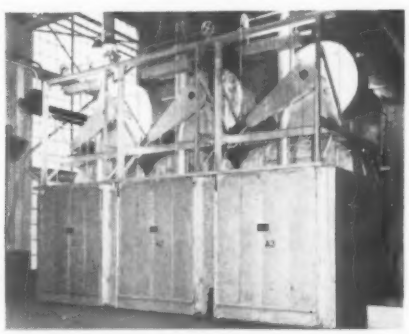

CARL-MAYER RACK TYPE OVENS. A recent installation for Large Aluminum Co.

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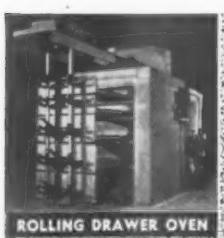
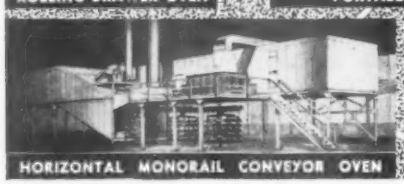


ROLLING DRAWER OVEN

PORTABLE RACK OVEN

VERTICAL OVEN

CAR TYPE OVEN



HORIZONTAL MONORAIL CONVEYOR OVEN

The CARL-MAYER *Corp.*

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CORE AND MOLD OVENS

FACTORS AFFECTING CORE BAKING

(*Continued from page 96*)

binders fall into four groups. In order of their required temperature to set these are: (1) Water soluble, hard setting types which will set at any temperature once the water is removed. This group includes starches, glutrines, dextrines and sugars. (2) Chemically reactive plastics, such as phenol, urea-formaldehydes, and bakelite. (3) Melting and solidifying binders, such as resins, pitches and asphalts, and (4) Oxidizing or polymerizing oils.

Binders Other than Core Oils: Each of the binders will have a temperature at which it begins decomposition. The maximum temperature of baking must be dependent on the dissociation temperature of the most heat sensitive binder in the mix. Since the binders of the first three groups require nothing more than the proper time at temperature they are the easiest to use and bake. The rules for most rapid baking of these binders are: Secure the desired temperature in the minimum of time without getting too hot; maintain that temperature for the minimum time to complete reactions.

Core Oils: Oils which require oxygen for oxidation will completely bond or dry only after sufficient oxygen has been made available regardless of time or temperature. All core oils in commercial use require oxidation since only partial polymerizing oils are available. Different commercial core oils require different temperatures for oxidation dependent on their make-up. Those of tung-oil will bake at a much lower temperature than those of linseed base. The lower temperature baking oils also decompose at lower temperatures, so that oven temperatures must be kept down. This results in slower water removal, but is in part made up by more rapid oxidation.

The experimental work reported here was done with a high temperature, partially polymerizing, linseed base, core oil. The most effective baking temperature was approximately 450° F. This core oil baked completely at 450° F at varied times, dependent on the percentage of oil present. Up to 0.7 per cent oil the core was dry to the center, when the center temperature reached 450° F. At 1.4 per cent oil the cores required 6 hours at temperature to bake com-

(*Continued on page 254*)

TABLE III—Time to Reach Indicated Temperatures

(Various Mixtures Table II)

	Time to 220° F	% of Standard
Standard mix	250 min	100
B	250 min	100
C	250 min	100
D	220 min	88
E	210 min	84
F	150 min	60
G	165 min	66
H	180 min	72
I	230 min	92
J	245 min	98
K	220 min	88
L	250 min	100
M	250 min	100

TABLE IV—Mechanical Factor

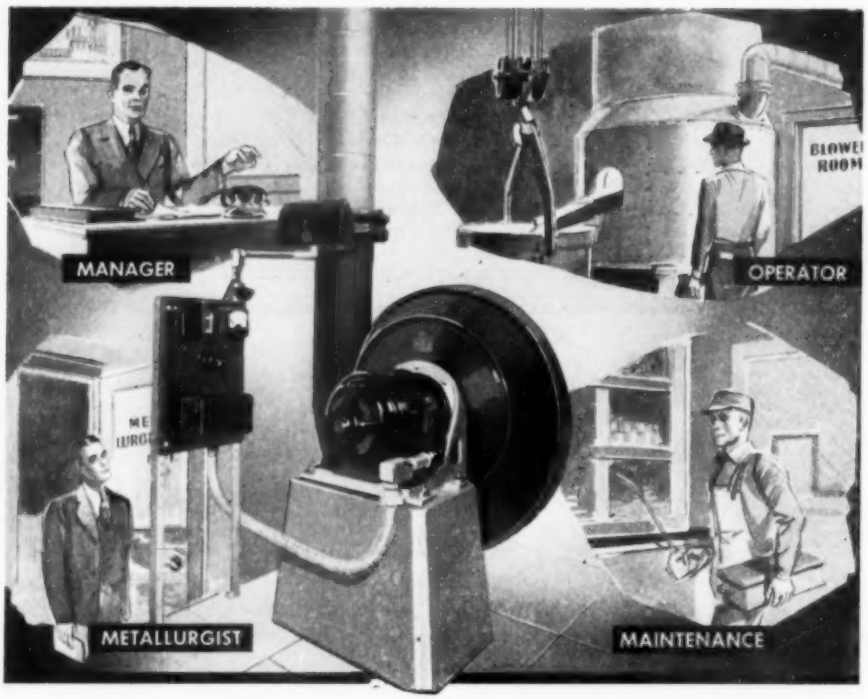
(Standard Mixture 8" Cube 450° F Oven)

A—Core plate—⅜" asbestos board
B—Core plate—¼" steel plate
C—Core plate—¼" steel plate perforated
D—Core plate—⅜" asbestos board, five ¼" vents in core
E—Core plate—⅜" asbestos board, five ¼" steel rods in core
F—Core plate—¼" steel plate perforated, five ¼" steel rods in core

TABLE V—Influence of Mechanical Factors

(Factors of Table IV)

	Time to 220° F	% Standard
A (Standard)	250 min	100
B	230 min	92
C	200 min	80
D	250 min	100
E	190 min	75
F	190 min	75



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(*Continued from page 252*)

pletely. At 2.1 per cent oil the core was not dry after 12 hours at temperature. The completion of bake was checked by breaking the core open as soon as it was removed from the oven.

Oxidation of Oils: If the hot cores with unbaked oil at their centers were allowed to cool in the open air, they showed dried centers. A reaction, evidenced by heavy smoking, can be noted when the hot but not completely dried cores are taken from the oven. By leaving the thermocouple in the center of the core when it was removed from the oven, it was possible to check the extent of the oxidizing reaction which seemed to accelerate in the open air. In the case of the 2.1 per cent oil core, removed from the oven when the center temperature had reached oven temperature of 450° F., it was found that the temperature continued to go up. After 10 minutes in the open air, the temperature had climbed to 475° F. This was 25 degrees above the oven temperature from which it was taken. The center held at 475° F for 9 minutes, and then started to decline. After 10 minutes more, the core was back to the oven temperature. A total of 29 minutes elapsed before the core returned to the temperature from which it began.

It should be remembered that these tests were run with 8-in. cubes and that smaller cores would have baked out in the oven, or would not have exhibited such marked reaction on removal from the oven. To prove that this phenomenon was one of oxidation, the core was supplied with pure oxygen by the method shown in Fig. 1. The rapidity of the reaction produced in this way is startling. Within two minutes from the time of removal from the oven and the start of flow of the oxygen, the temperature had climbed to 775° F. Temperatures were still going up rapidly when the core collapsed. The quantity of pure oxygen required was large and makes one wonder how much impure air in the oven would be required to do the job of oxidizing the oil. During the addition of the oxygen, a large volume of smoke exuded, and after collapse the core exhibited a completely white sand center. All organic matter had been oxidized.

Oxygen Migration: The acceleration of oxidation, exhibited upon removal of the hot core from the oven to open air, results from more rapid penetration of the oxygen to its center. It is reasonable to suppose that the temperature difference between the external air and the center of the core would result in a flue-like effect through the porous openings between the sand grains. While the core is in the oven the atmosphere is of the same temperature as the core itself and there would be no physical force present to move oxygen into the core, other than that secured by rather slow diffusion.

If diffusion is the only method by which oxygen can penetrate the core while at temperature in the oven, then every effort should be made to have as rich an oxygen atmosphere as possible. The laws of gaseous diffusion point out this necessity. Extreme difficulty in completely setting the oil in a very dense core, such as one heavy in silica flour, bears out the above explanation of how oxygen enters the core. The migration of oxygen into the core must be aided for rapid drying. Migration is automatically obtained when hot cores are withdrawn into cool air. Oil sand cores should not be gradually cooled down in the oven unless a large

(*Concluded on page 256*)

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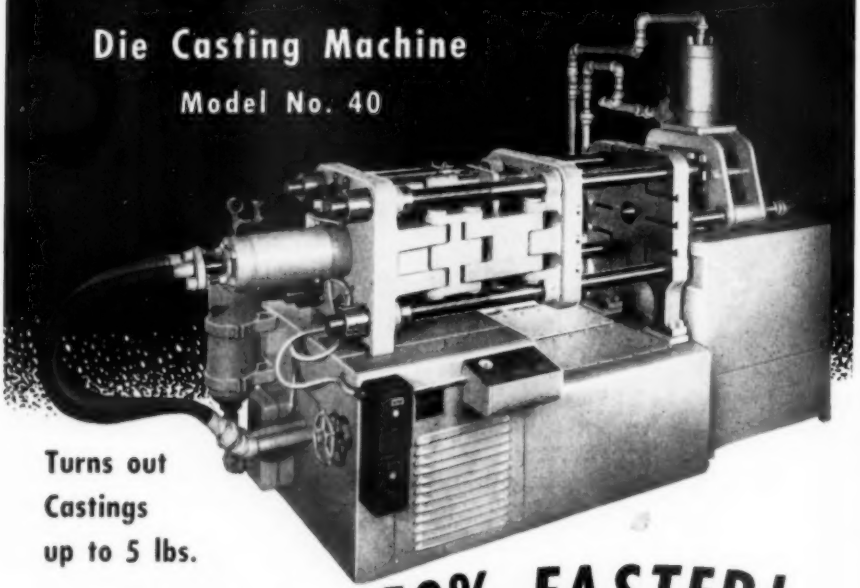

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(*Concluded from page* 254)

quantity of cool air is supplied.

Determination of a Complete Bake: The complete baking of oil sand cores is difficult and requires good ovens, properly maintained. The scooping out and addition of dry sand or cinders to the centers of large cores is good practice. Cores should not be removed from the oven before their centers have reached a temperature sufficiently high, to assure that the oxidation reaction will continue in the open air.

The common method of determining when the core has baked through is by examination of its surface, texture and color. This method is fairly safe in the hands of experienced oven tenders, but is fraught with danger for the uninitiated. Fig. 3 shows the lag in temperature between the surface and center of 8-in. cube cores baked at two different temperatures. The same type curves would be exhibited by two cores of different thickness in the same oven.

Only through the appreciation of the complexity of core drying and attention to the many details involved in both the structure of the oven and the core can uniformly well dried cores be secured.

Metal Guild Plans Annual Meeting

The Electric Metal Makers Guild Inc. will hold its sixteenth annual meeting at Bethlehem, Pa., June 16, 17 and 18.

Among the papers to be delivered are: "Fundamentals in Steel Melting," by Dr. C. H. Herty Jr., Bethlehem Steel Co., Bethlehem, Pa., and "Hydrogen and Nitrogen Contents of Steel," by C. E. Sims, Battelle Memorial Institute, Columbus, O. J. M. Sylvester, general manager of Bethlehem plants, Bethlehem Steel Co., will speak at the annual banquet.

R. H. Frank, Bonney-Floyd Co., Columbus, is president of the guild; A. J. Scheid Jr., Columbia Tool Steel Co., Chicago Heights, Ill., is vice president and D. L. Clark, Simonds Saw & Steel Co., Fitchburg, Mass., is secretary-treasurer.

Materials Handling

Proceedings of the technical sessions held concurrently with the Second National Materials Handling Exposition, January, 1948, at Cleveland, have been published by Clapp & Poliak Inc., New York. The booklet is entitled "Some Basic Techniques in Materials Handling."

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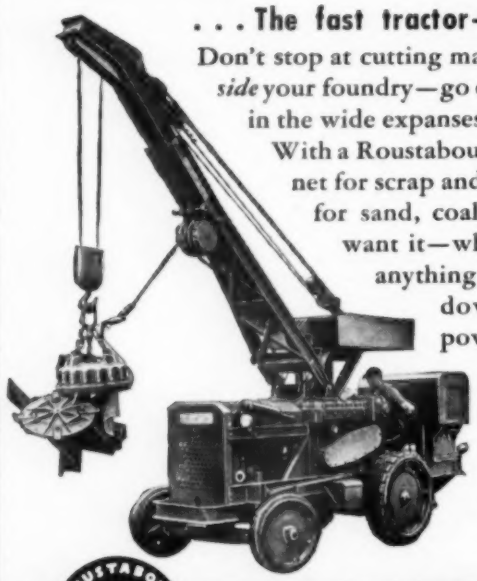

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NICKEL, ZINC AND LEAD ADDITIONS TO 5% TIN BRONZE

(*Continued from page* 103)

pressure testing were poured into green sand molds. The sand was Albany 00, having an AFA permeability of 22, green compressive strength of 4 to 6 psi, and a moisture content of about 6 per cent. The molds were permitted to air dry for four hours before casting.

The tensile specimens were 0.505-in. in diameter with 2-in. gage length. The yield strength was taken by the 0.5 per cent offset method. The bushings for the pressure tests were 4½ in. long, 2-in. inside diameter and 2¾ in. outside diameter. The bushings were tested first as-cast, then with the inside machined and finally with both the inside and the outside machined. The final wall thickness was 11/32-in.

In this discussion the following identifications have been adopted: 5-5-2 = 5 per cent tin, 5 per cent nickel, 2 per cent zinc, 88 per cent copper. 5-3-4 = 5 per cent tin, 3 per cent nickel, 4 per cent zinc, 88 per cent copper. 5-2-5 = 5 per cent tin, 2 per cent nickel, 5 per cent zinc, 88 per cent copper. 88-8-4 = 88 per cent copper, 8 per cent tin, 4 per cent zinc.

The effects of the various percentages of nickel and zinc on a bronze containing 5 per cent tin are shown in Figs. 1, 2 and 3.

The 5-5-2 Alloys — The range of tensile strength of the 5-5-2 alloys extends from 43,000 to 49,000 psi. (Fig. 1). The tensile strengths of all the alloys except the 1.90 per cent lead are influenced somewhat by pouring temperature as shown by the slight decrease in strength as pouring temperature changes from 1150°C to 1300°C. The 1.90 per cent lead alloy remains close to 44,000 psi regardless of pouring temperature. The yield point of the lead-free alloy is unaffected by pouring temperature, but the addition of lead causes it to decrease slightly with increase in temperature. The presence of lead is more harmful to the elongation than to any other mechanical property. The decrease in elongation from nearly 40 per cent to nearly 25 per cent upon addition of 1.9 per cent of lead is too great for an alloy that is intended as a substitute for gun metal. This alloy shows the normal change of fluidity with temperature.

The 5-3-4 Alloys—The properties of the 5-3-4 alloys given in Fig. 2 ap-

(*Continued on page* 260)

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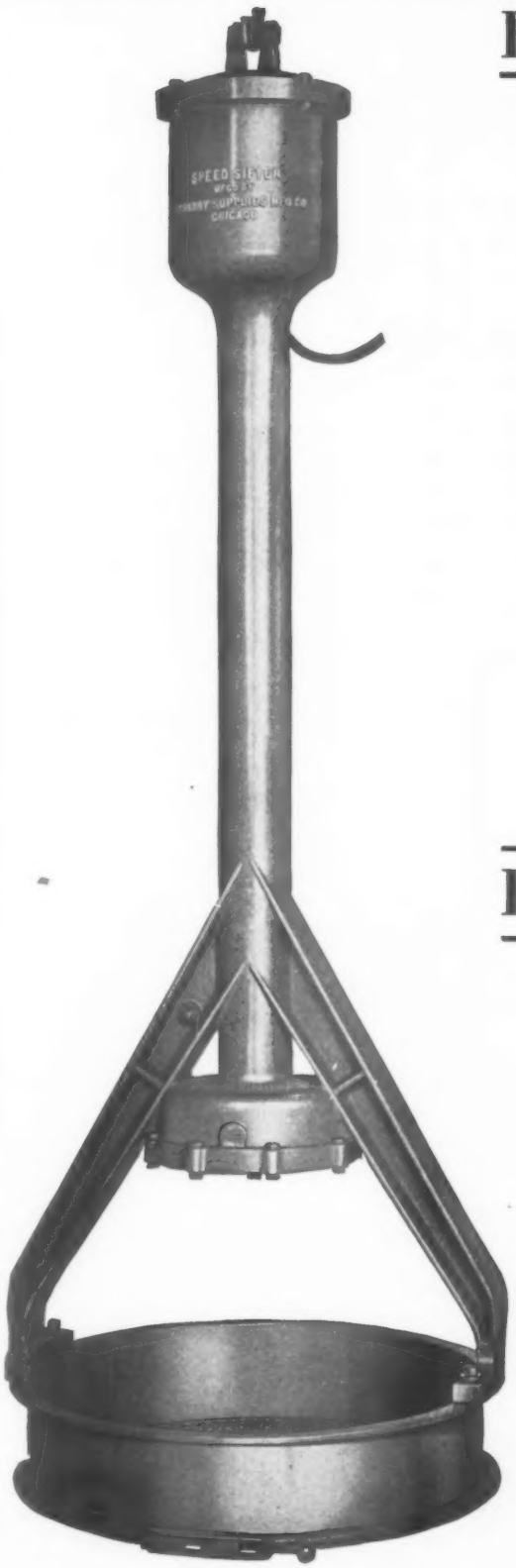

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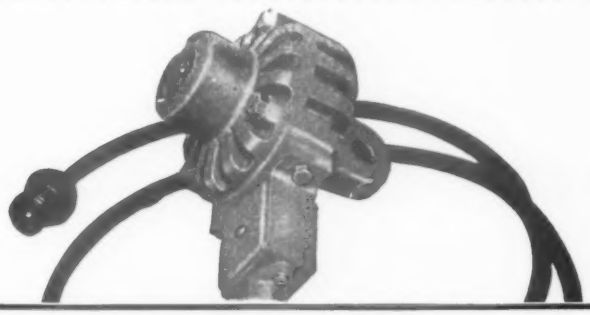

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(*Continued from page* 258)

pear favorable in all respects. The tensile strength and yield point are somewhat lower than the corresponding properties of 5-5-2 alloys. There is no tendency, however, for the elongation to fall into the questionable range. The alloy is similar to the 5-5-2 in that it is more likely to have somewhat lower tensile strength when poured at higher temperatures. The fluidity of this alloy is similar to the fluidity of gun metal. This alloy meets the requirements of insensitivity to lead contamination and excessive pouring temperatures that are likely to exist under adverse foundry conditions.

The 5-2-5 Alloys—The 5-2-5 alloy requires little discussion because it is disqualified from the standpoint of both tensile strength and yield point. The tensile strength of the alloy is generally too close to 40,000 psi when the alloy is poured at 1160°C to 1260°C. The elongation and fluidity are normal for gun metal type alloys.

Pressure Tightness—The methods used in gating and risering gun metal bushings are very critical. With proper conditions of feeding nearly all bushings can be made pressure tight regardless of changes in composition. Castings poured with very unfavorable foundry practice, however, are very likely to show leakage regardless of composition. The bushing shown in Fig. 5 is one that has been found fairly sensitive to variations and was, therefore, selected for this investigation. All of the bronze alloys investigated withstood pressures of at least 750 lb, provided the pouring temperature was not too low and the metal sufficiently deoxidized before casting. There was no important difference in pressure tightness in the three compositions. Under the specific test conditions, these alloys were superior to gun metal (88-8-4) in pressure tightness, as shown in the following table:

Alloys*	Number of Bushings Tested	% Failures Below 750-lb Hydrostatic Pressure
5-5-2	58	3.45
5-3-4	90	2.22
5-2-5	60	1.67
Gun metal (88-8-4)	22	41.00

* All alloys, with and without lead.

Since nickel bronzes are recognized as having superior pressure tightness, some foundries have recently added nickel to bronzes as a routine practice. The addition of lead is also well known for improving resistance to leakage. The superiority of the nickel and nickel-leaded bronzes is believed to be due to the nickel changing the form of the dendrites so

(*Concluded on page* 262)

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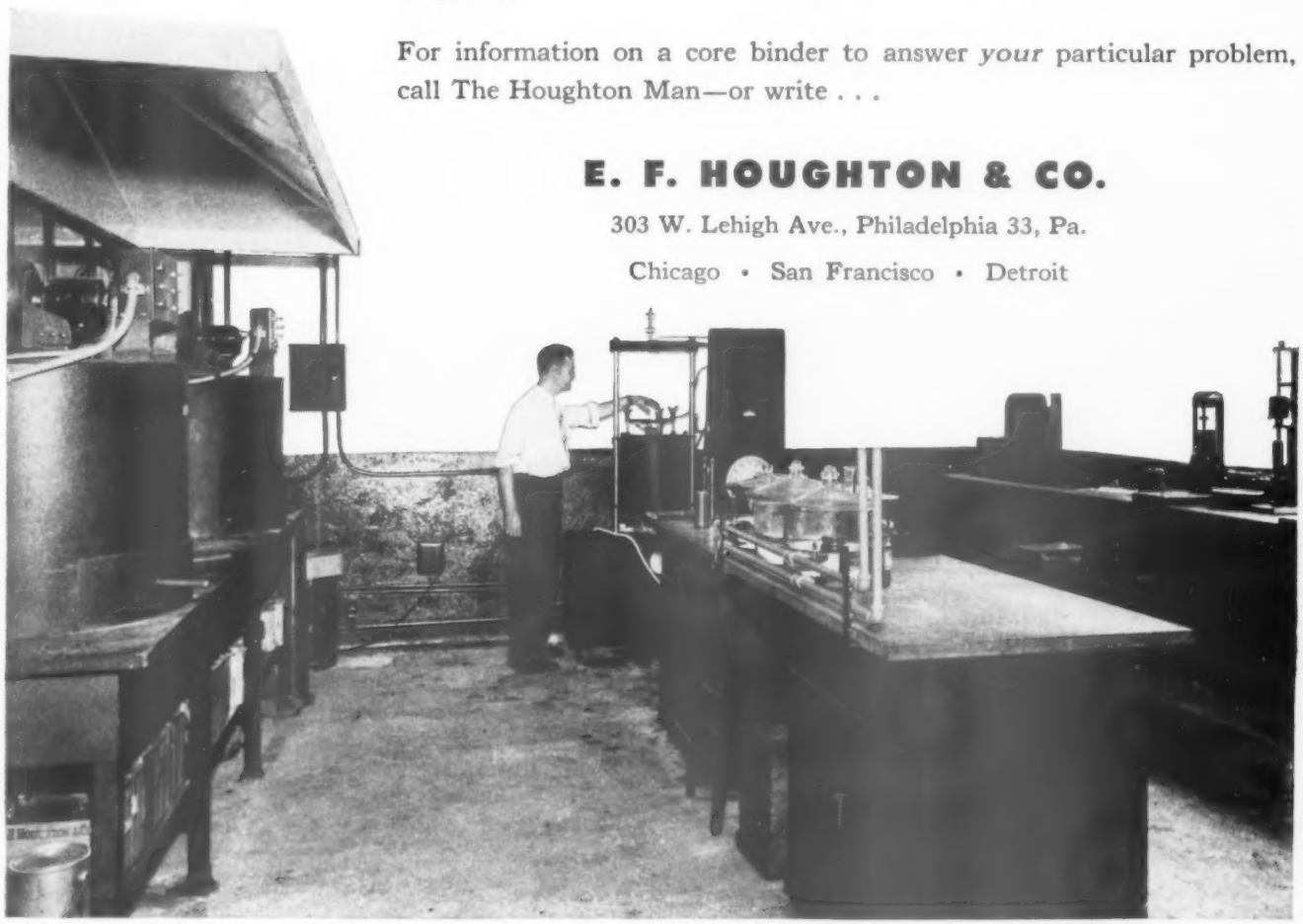

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(*Concluded from page* 260)

as to produce less interdendritic shrinkage and by the molten lead flowing into the shrinkage cavities and partially filling them. Also it is felt that the strengthening effect of nickel tends to counteract the generally poor mechanical properties induced by lead.

Conclusions — 1. The mechanical properties of the nickel-tin bronzes 5-5-2 and 5-3-4 fall within the range of properties expected of gun metal (88-8-4) of good quality.

2. The nickel-tin bronze 5-2-5 is not considered an acceptable substitute for 88-8-4 because of its generally low mechanical properties.

3. Of the three alloys investigated the 5-3-4 is believed to be the most suitable prospective substitute for 88-8-4 because of its relative insensitivity to contamination by lead.

4. The pressure tightness of the three nickel-tin bronzes 5-5-2, 5-3-4 and 5-2-5 is much superior to the pressure tightness of gun metal (88-8-4) of conventional composition.

Note: The views expressed herein are those of the author and do not necessarily reflect the views of the Navy.

ALUMINUM ALLOY CASTINGS

(*Continued from page* 97)

usefulness was in indicating areas stressed beyond the yield strength of the material. Development of Stresscoat extended the usefulness of the brittle lacquers by giving quantitative indications of principal stresses, both tensile and compressive. By shortening the time required to develop new aircraft engine designs from two years or longer to a matter of weeks, this method made a tremendous contribution to war production. Development work on other casting designs was similarly accelerated.

In application, parts to be tested are first thoroughly cleaned and sprayed with a thin coat of aluminum paint to improve the reflectivity. The brittle lacquer then is sprayed on over the aluminum paint. A calibration bar is prepared at the same time in the same manner, care being taken that the coatings are of the same and proper thickness. After drying and hardening for at least 18 hours, loads are applied both to the parts being tested and to the test bar. Loads applied to parts under test should simulate as nearly as possible those expected under service conditions.

When the coated parts are stressed,

(*Continued on page* 264)

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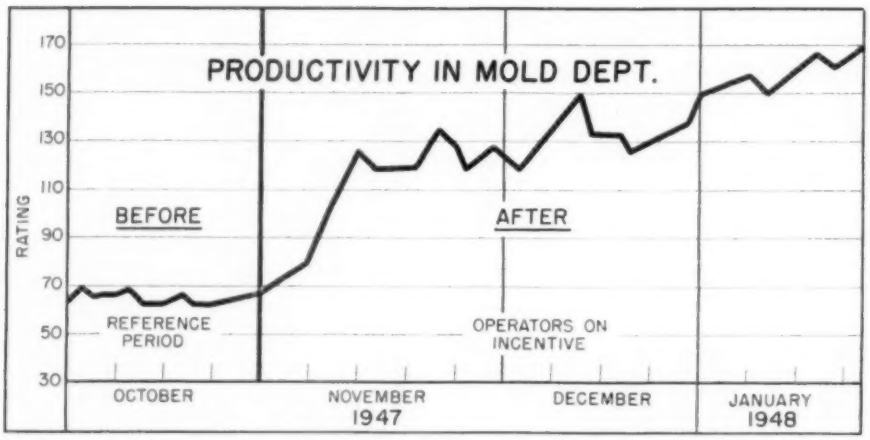

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(*Continued from page* 262)

the lacquer will crack because of its unyielding nature, the spacing of the cracks indicating the stress by comparison with cracks developed when a known load is applied to the calibration bar. Cracks occur perpendicularly to the direction of the applied stress.

Several precautions must be observed in the use of the brittle-lacquered method. As it contains a carbon disulphide vehicle, which is poisonous and inflammable, spray booths must be carefully hooded. Both temperature and humidity of the test rooms must be closely controlled, because thermal expansion would cause cracks, and because the coatings are affected by changes in humidity.

When testing for compressive stresses, the load is applied and held for two or three hours. During this time, the lacquer will take a permanent set. Strain cracks will develop upon releasing the load, which will give an indication of the stresses causing the deformation.

Employ Strain Gage

Although the brittle-lacquer method will give a quantitative indication of strain over a considerable range, it is difficult to determine the strain at points where the stresses are highly concentrated. When these stresses must be determined, one of the well known types of strain gages may be used.

For measurements at room temperatures, a gage of the Huggenberger type is useful where a gage length of ½-in. or more is available for test. For shorter gage lengths, down to 1/16-in., a photoelectric gage of the type developed by the research laboratories of General Motors Corp. may be used. Resistance wire strain gages are useful where tests are desired at elevated temperatures; these are practical for gage lengths as short as ¼-in.

After repeated stress analysis and design alterations have culminated in a final design, it usually is desirable to test a highly stressed casting under service conditions at loads above those expected in normal operation. Results of these tests will serve as a check against the correctness of the final design.

Photoelastic stress analysis with the aid of polarized light also is a valuable tool in locating regions where stress concentrations exist, especially in forms of irregular contour. All that is necessary is to fashion a model of the part from a soft plastic material. After it hardens, stress is applied and examination made by means of polarized light.

(*Continued on page* 266)

AT LAST! A Sensational New

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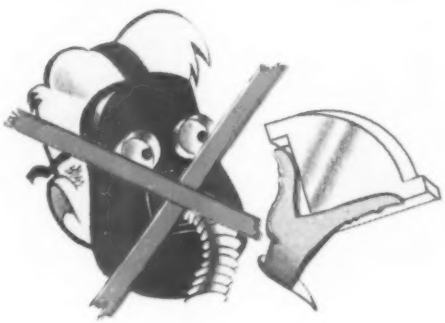
SYNOL

Sensational new SYNOL — like adding an extra oven in your foundry! *Slashes baking time by 30-50%!*

Sensational new SYNOL—Eliminates moisture pickup and condensation. Synol-made cores are *moisture-proof!*



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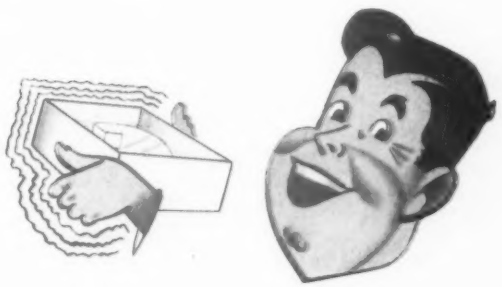

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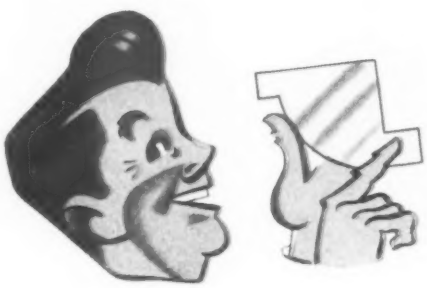

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ABRASIVES AND BLASTING EQUIPMENT

(*Continued from page* 264)

Visual observation will show the locations of maximum stress. When design changes are made it is only necessary to fashion a new model, or alter the previous one, after which a second examination may be made.

The photoelastic method of analysis is said to yield results in close agreement with the mathematical theory of elasticity. Since the development of Polaroid some years ago, the cost of equipment required for this method has been brought within reach of even small design offices and laboratories.

X-ray examination proved of inestimable value in the inspection of aluminum aircraft and other castings during the recent war. It will prove equally useful in maintaining the quality of castings for peacetime uses. (This subject will be covered in a separate article of this series). Development of the proper design, and establishment of proper foundry procedures also are facilitated by x-ray examination.

Reverse Relative Emphasis

One of the larger aircraft companies recently made a thorough study of its program of inspection by x-ray and other methods. Up to that time x-ray inspection had been used primarily as a tool in large-scale routine inspection, with improvement of the parts through correction of any defects revealed by such inspection more of a secondary function. After studying various aspects of the problem, it was decided that this relative emphasis should be reversed. Therefore, future work was based on the premise that the primary purpose of x-ray inspection was to serve as a creative means for improving the quality of castings by changes in the design where this appeared to be necessary, by correction of faulty foundry technique, and by improvement in pattern or mold equipment.

Detailed reports of x-ray inspections are made regularly and turned over to a control office which in turn makes appropriate recommendations to the production engineering division. Where corrections in design are indicated, these recommendations are transmitted to the design groups or the foundry to secure immediate correction of the difficulty observed.

Conclusion — Careful consideration and intelligent application of the various factors influencing the design of aluminum castings will aid in obtaining high quality and economical foundry operations. Some of these factors are related to functional requirements, and some are imposed

(*Concluded on page* 268)

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- switch from bucket to platform without tools . . . in less than a minute
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(*Concluded from page* 266)

by the casting processes.

Pattern or mold equipment of proper design is fully as important as correct casting design. Except where the expected production is very small, permanent metal pattern equipment not only is economical but also improves casting quality.

Stress analyses by the brittle-lacquer method supplemented by strain-gage tests will aid in establishing the correct design and proportion of highly stressed parts. X-ray inspection also will aid in the initial development of correct design of the casting as well as the gating of the mold and other production procedures.

Through all steps in the design process the importance of close consultation and full co-operation between the design engineer, the metallurgist, the pattern or mold maker, and the foundryman cannot be overemphasized.

Editor's Note: Future articles in this series on aluminum alloy castings will discuss permanent mold practices, trimming, machining and finishing, heat treatment, inspection and quality control.

Will Revise Gray Iron Cost Manual

Gray Iron Founders' Society is revising "Cost Manual No. 1," describing its basic cost accounting system for gray iron foundries. Plans also call for a new manual outlining advance cost methods, which will be issued as "Cost Manual No. 2."

Revision of the present manual will streamline the basic accounting procedures for gray iron foundries. Fundamental principles will remain unchanged, but revisions in the text are expected to simplify and clarify the procedures. A cost dictionary, to be included in the revised edition, will indicate the correct accounts against which various items of cost should be charged.

The new manual is intended for use by those desiring to install advanced accounting methods. Determination of the cost of melted metal on a yield basis, the use of differential departmental overheads and other advanced accounting technique will be covered.

Completes Expansion

Western Foundry Co., Chicago, has completed an expansion program to supplement the work of its foundries. A machine shop for machining of castings has been set up and buildings at the Chicago plant have been remodeled and expanded.

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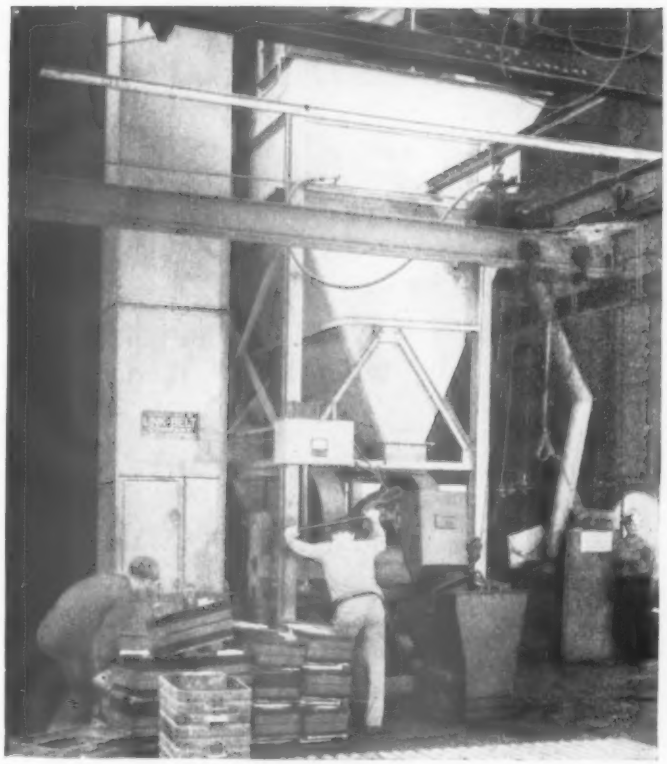

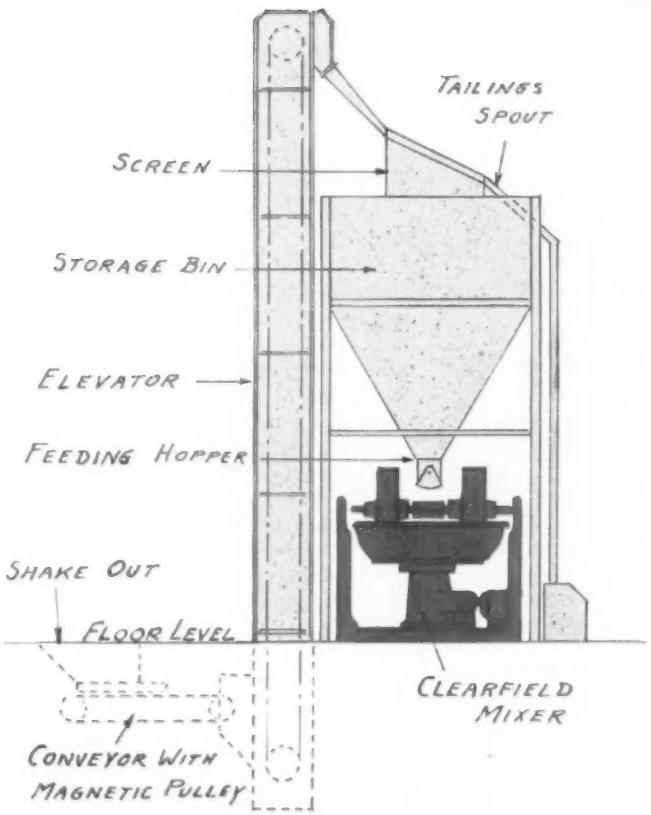

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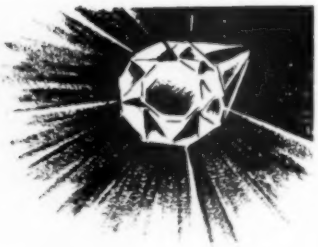

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NEW ALLOY FOUNDRY TYPIFIES MODERN DESIGN

(*Continued from page* 108)

naces and are added to the charge or in the ladle, according to instructions from the metallurgist in charge of operations.

Majority of the castings fall into three general classifications—abrasive resistance, corrosion resistance and heat resistance. Typical analysis of the second is: C 0.07 per cent, Cr 19.00 per cent, Ni 9.00 per cent, Mn 0.75 per cent, Si 1.25 per cent. The analysis of one of the heat resistant metals shows: C 0.40 per cent, Cr 15.00 per cent, Ni 35.00 per cent, Mn 0.75 per cent, Si 1.25 per cent. These compositions are varied to meet certain specified conditions. In the corrosion resistance class 28 varieties are recognized. Ten varieties are listed in the heat resistance class. The patented alloy known as Ni-resist is produced under licence from the International Nickel Co. Published analysis of Type 1 Ni-Resist (there are five types) shows: C 2.75-3.10 per cent, Si 1.00-2.00 per cent, Ni 13.00-15.00 per cent, Cu 5.00-7.00 per cent, Cr 1.25-4.00 per cent, Mn 1.00-1.50 per cent.

Modern Core Room

The coremaking department extends across two bays at the south end of the foundry. Sand is prepared in a muller type unit and is distributed to the various coremaking stations by a bucket suspended from a monorail hoist. Small cores are made by hand on the benches and on the core blowing machines. Some of the large cores are rammed on jolt machines, while others are rammed by hand in coreboxes resting on the floor. The cores are baked in one car type and two rack type oil-fired ovens, electronically controlled. The large cores are filled with coke to facilitate contraction of the casting and to assist in the ready removal of sand from the casting in the cleaning room.

Small castings are molded in green sand without any facing material shaken from a bag or applied with a brush. Medium and large size molds and cores are sprayed with a refractory wash. The wash is allowed to air dry for a short period and then the face of the mold or core is dried with a torch. All castings present a perfectly clean, smooth skin. In the shakeout the sand falls away completely, not only from plane surfaces,

(*Continued on page* 272)

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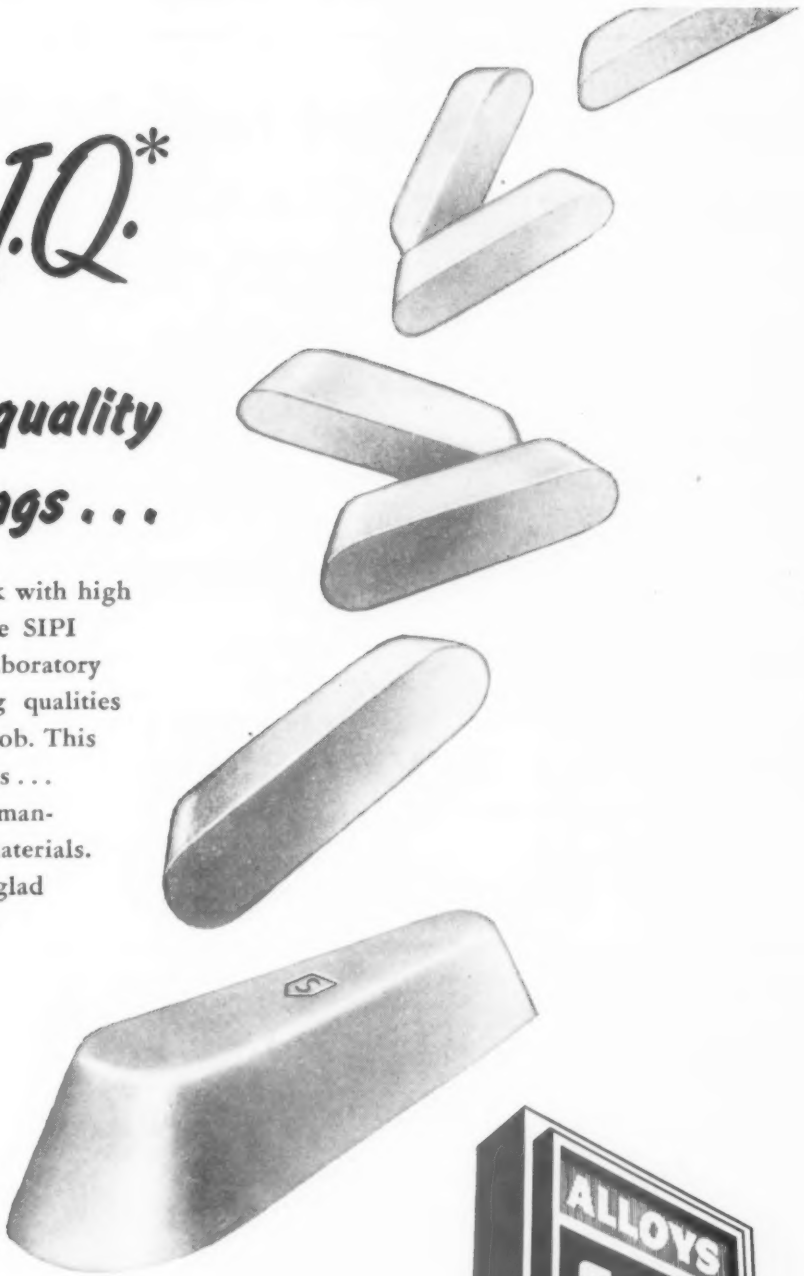

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(*Continued from page* 270)

but from the interior, from under flanges, from pockets and other areas where a certain amount of sand usually clings until it is removed in the cleaning room.

Passage through a chamber where they are exposed to a stream of metal abrasive constitutes the first stage in a series of inspections that follows each casting from the shakeout to the shipping dock at the north end of the cleaning bay. At this dock the castings may be loaded into trucks or railroad cars.

Two electronically-controlled furnaces are provided for the various heat treating techniques ranging from ordinary stress relieving at low temperatures to quench annealing of stainless steel casting at 2200 F. One is a large type furnace. The other is a medium size batch type furnace. A quench tank at floor level is located between the two furnaces. All metal handling items in the cycle of production, from making up the charges to final inspection are under the supervision of the plant metallurgical department.

Castings Move Steadily

In the carefully laid out cleaning and finishing room castings move practically on a production line schedule. Temporary stopping stages include rough inspection and chipping, grinding and tumbling, rough sandblast and preliminary inspection, x-ray rooms, welding and heat treating, finish pressure blast, Zy-Glo test and finally physical inspection and testing. Stationary grinding stands are operated in specially constructed booths designed for the comfort and protection of the operators. Two complete dust arrestor systems serve swing shaft, stiff shaft and bench grinding enclosed booths, tumbling mills and abrasive cutoff machines. Where assembling of castings in various combinations is necessary, the work is done by skilled welders using three methods—electric arc, atomic hydrogen and oxyacetylene. Large and intricate weldments are stress relieved in an 8 x 15 ft car type electronically-controlled furnace. The inspection department reports directly to the metallurgical department.

Castings finally are inspected by three general methods. Castings for certain specific operating conditions, muffles, pots, retorts, valves and other castings of a similar type, are subject to thorough x-ray examination. Two industrial type x-ray units, with capacities of 200,000 and 250,000 volts, are used to disclose internal defects, shrinks, spongy metal, blow

(*Concluded on page* 274)

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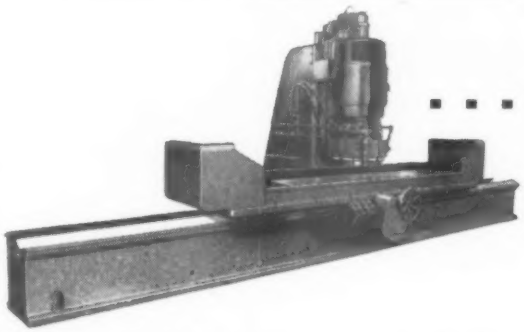

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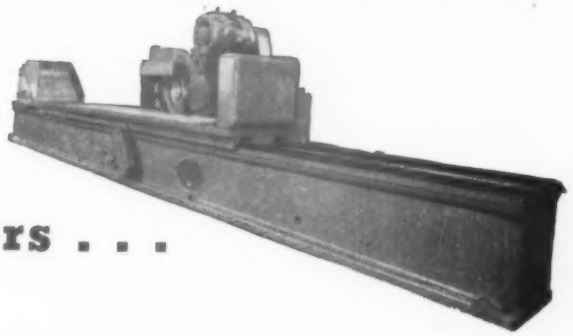
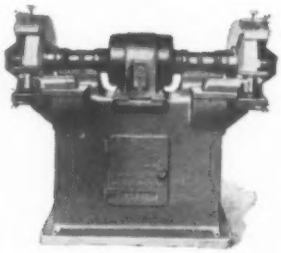


for horizontal face grinders . . .



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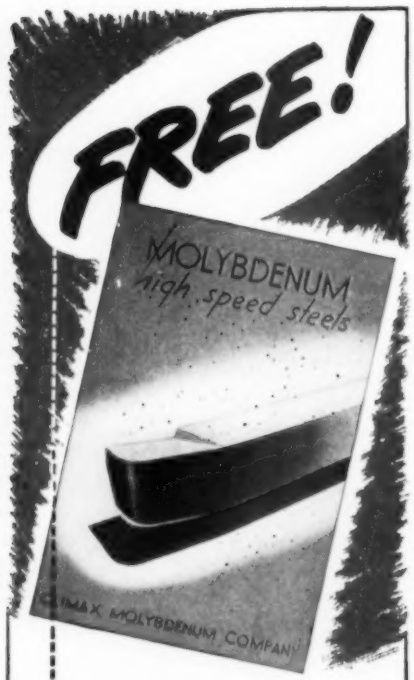

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MOLYBDIC OXIDE — BRIQUETTED OR CANNED • FERROMOLYBDENUM • "CALCIUM MOLYBDATE" • CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.

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Company.....

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(*Concluded from page* 272)

holes, etc., which ordinarily would pass other inspection tests. X-ray tests are conducted in two large rooms equipped with huge lead and steel doors, concrete walls 12 in. thick and steel rails over which transfer cars bring large castings directly to the x-ray units. Negatives are developed, processed and viewed in a modern complete dark room.

Radiographic rooms in the x-ray section of the inspection department are so laid out and designed that even the most difficult examining positions on complicated castings are obtained with minimum effort. All examinations are conducted by highly trained industrial radiographers supervised by the plant metallurgist.

Microscopic fissures invisible to the naked eye are located by a black light unit which contains a lamp that emits near-ultraviolet light in the wave-length range between 3200 and 4000 angstrom units. In applying this test, the casting first is covered with a highly fluorescent penetrating oil, then washed with water, dried and dusted with a powder which adheres to any traces of oil which may have penetrated into the microscopic cracks. Under the black light the powder glows and reveals the length, width and depth of any surface cracks. Casting cracks also are revealed by pressure testing under oil, air or water.

The foundry laboratory includes a complete chemical laboratory, a sand laboratory, and a physical laboratory. Two large rooms in the new plant contain the complete scientific equipment necessary for detailed, precise testing and analysis. Equipment includes miniature electric furnaces, moisture tellers, testing machines, precise weighing equipment, and every other device found in modern progressive laboratories.

Book Review

Book of ASTM Standards, Part I-B Nonferrous Metals, cloth, 917 pages, 5 ⅞ x 9 inches, published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3. Price $8.

This volume comprises one of a series of five parts forming the 1946 compilation of all the standards and tentatives formally adopted by the American Society for Testing Materials, and contains only those relating to nonferrous metals and alloys. Nearly 200 standards and tentatives are included and apply to copper and copper-base alloys, aluminum and aluminum-base alloys, magnesium and magnesium-base alloys, zinc and zinc-base alloys, lead and tin-base alloys, solder metal, nickel and nickel-base alloys, die-casting, electrical-heating resistance and related alloys, metal powders and products, electrodeposited coatings, corrosion tests of nonferrous metals and alloys, general methods of testing nonferrous metals.

Pages in the book are double column style which provides easy reading. Several indexes are included to aid in quickly locating any specification. In one the specifications are listed as to type of metal or alloy; in another they are listed in numerical sequence while in the third they are listed under subject.

New Film Stresses Human Relations

By Lyne S. Metcalfe

The philosophy of Benjamin Franklin, whose wisdom covered the ability to get along with people, has been made the theme of a new sound motion picture, "Strange Interview," produced by the Jam Handy Organization Inc., Detroit, for the General Motors Corp. employee relations staff. The film is available on loan without charge to interested groups in the foundry and metals field. Inquiries regarding the film should be addressed to the Film Section, General Motors Corp., 9-252 General Motors Bldg., Detroit 2.

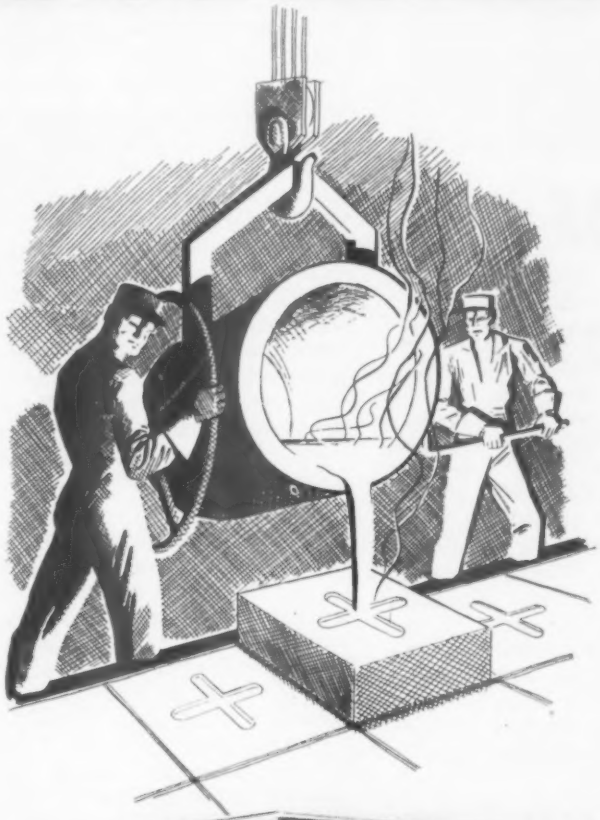
The picture, which has a screening time of approximately 55 minutes, is about people, not about their machines or products. It shows the causes of friction between management and the worker, and how they

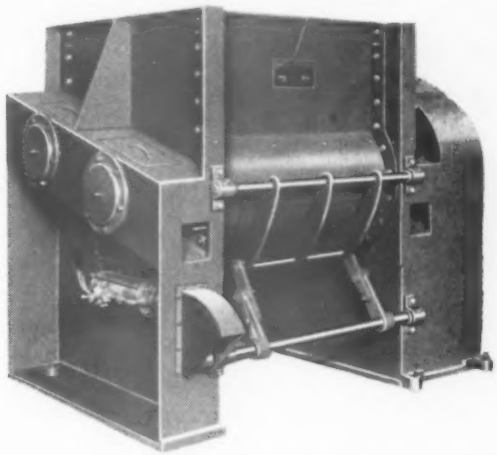
An example of how not to win friendly employee relations is portrayed

may be avoided. Main characters in the film include Bill Parker, who conducts a small business, his wife Mary, his friend Ed Campbell, and a "reincarnated" Ben Franklin, who sets Bill straight on the right kind of philosophy for getting along with people.

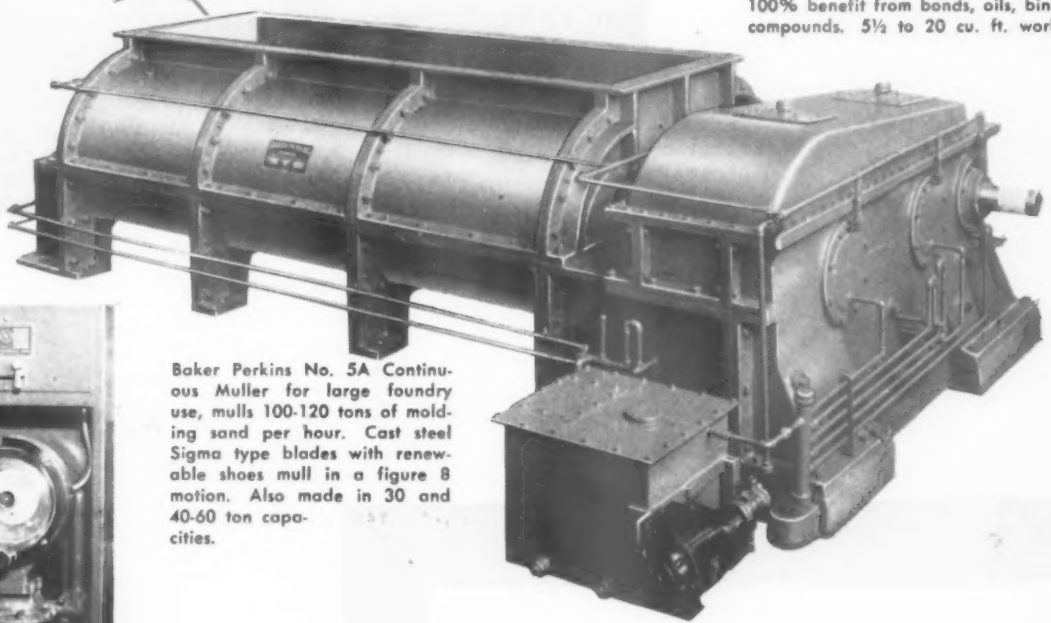
FOR BETTER CASTINGS, USE BETTER SAND MIXERS

One sure way to produce better castings is by improving your core sand. Baker Perkins foundry equipment can help you do this important job. Baker Perkins continuous mullers, batch-type core sand mixers, liquid meters, and traveling sand scales are doing an efficient job in a great many of America's most successful foundries. Any one or all of these units may be integrated into your production system to help you reduce the percentage of faulty castings and thus help increase your profits. Our engineers will be glad to study your requirements and make specific recommendations.

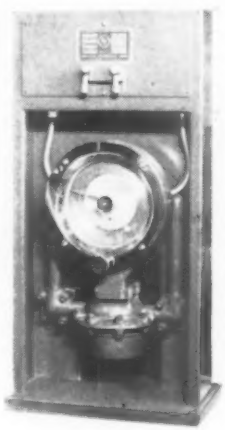




Baker Perkins "Unidor" Core Sand Mixer. Rubs, stirs, and kneads in one operation. Distributes a thin layer of bond around each grain, assuring 100% benefit from bonds, oils, binders, and other compounds. 5½ to 20 cu. ft. working capacities.



Baker Perkins No. 5A Continuous Muller for large foundry use, mulls 100-120 tons of molding sand per hour. Cast steel Sigma type blades with renewable shoes mull in a figure 8 motion. Also made in 30 and 40-60 ton capacities.



Baker Perkins Liquid Meter for accurately and automatically measuring water or binding oil flowing into each B-P Core Sand Mixer. Simple! — just dial the amount of liquid desired and the control mechanism does the rest. Capacities up to 600 lbs.

BAKER PERKINS INC.

FOUNDRY EQUIPMENT SALES

SAGINAW, MICHIGAN

NEW Equipment AND Supplies

1

2

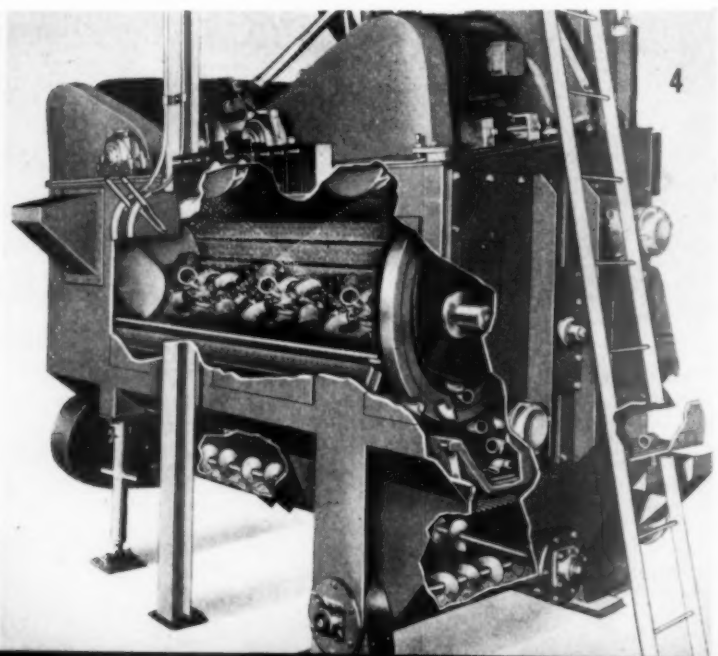
(1)—Cut-Off Wheel: Norton Co., 1 New Bond St., Worcester, Mass.—Flexible, reinforced resinoid cut-off wheel, known as the Norflex wheel, developed especially for nonferrous foundries is of reinforced construction designed to give it a high safety factor against breakage, fast cutting action and a low rate of wear. Under heavy side pressure the wheel will bend without breaking. Cutting action is enhanced by the file-like surface presented by the wheel's sides. Wheels are available in 14, 16 and 20 in. diameters and in two thicknesses, 5/32 and 3/16 in., and in three grades of hardness.

(2)—Chain Hoist Trolley: Saginaw Products Corp., 38 A River St., Saginaw, Mich.—Chain hoist trolley for use on I-beam overhead conveyor has wheels of carburized and hardened strip steel with deep flanges to prevent wheels from climbing the track. Because of the design, the ball bearing wheels are said to hold lubricant and exclude dust and grit. Standard grease fittings are supplied for positive pressure gun lubrication. Heavy sideplates extend past wheels, acting as bumpers, and are selfaligning to distribute load equally on all four wheels. Halves of the trolley are adjustable to permit mounting at any point on the I-beam, and spacing washers are said to permit exact adjustment on I-beam from 3 to 18 in.

(3)—Fork Truck Cab: Clark Equipment Co., Tructractor Division, 258 Champion St., Battle Creek, Mich.—Welded steel, sound insulated, all-weather cab for use on the company's "Yardlift-40," pneumatic tired fork truck is fully enclosed with entrance door on the driver side. It is equipped with sliding windows, safety glass throughout, upper window of glare-proof glass, rear-view mirror and windshield wiper. Hot water heater is available as extra equipment. Cab is said to be easily mountable for field installation.

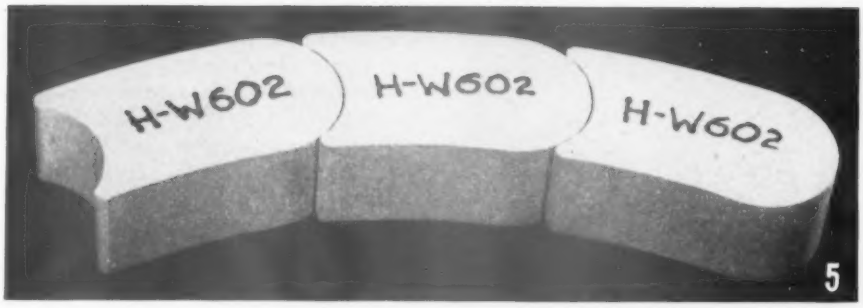
(4)—Blast Cleaning: American Wheelabrator & Equipment Corp., 505 South Byrkit St., Mishawaka 2, Ind.—Combining longitudinal travel of work, tumbling and airless blast cleaning, this machine is said to offer thorough cleaning and uninterrupted efficiency. Machine is designed so that no time is lost for starting, stopping, loading and unloading; parts are fed into and discharge from the machine in a continuous flow. Work to be cleaned is carried through the blast barrel on an endless apron type conveyor which constantly tumbles and cascades the pieces, exposing all surfaces to the full effect of the abrasive blast. Speed of tumbling and the flow of work through the mill can be adjusted to suit the work, consequently rate of production and quality of cleaning can be controlled.

3



4

(5)—Cupola Block: Harbison-Walker Refractories Co., Farmers Bank Bldg., Pittsburgh 22 — Newly designed refractory cupola blocks are said to permit setting a wide range of lining diameters with whole blocks of a single shape. Cupolas with inside diameters from 2 to 8 ft and larger can be accommodated in multiples of 3 in. The new shape features alternate convex and concave ends designed to form a flexible but tight fitted-curve end joint that maintains contact over the entire end surfaces regardless of lining diameter. It is claimed that the flexibility of the joint also permits accurate setting in stacks that are warped or slightly out of round. The blocks are recommended for vertical tanks or furnace linings rather than horizontal cylindrical shells. Made of a fireclay product of various blends and burnings to best adapt to particular cupola services, the blocks come in three sizes to provide 4½, 6 and 9-in. linings.

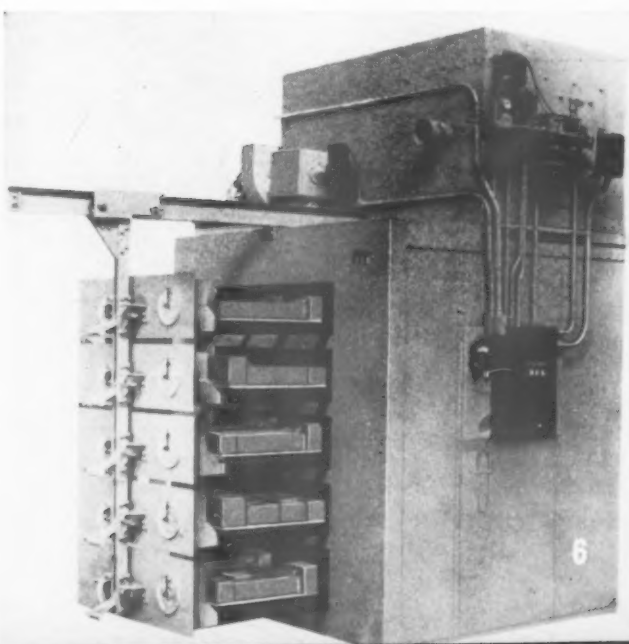


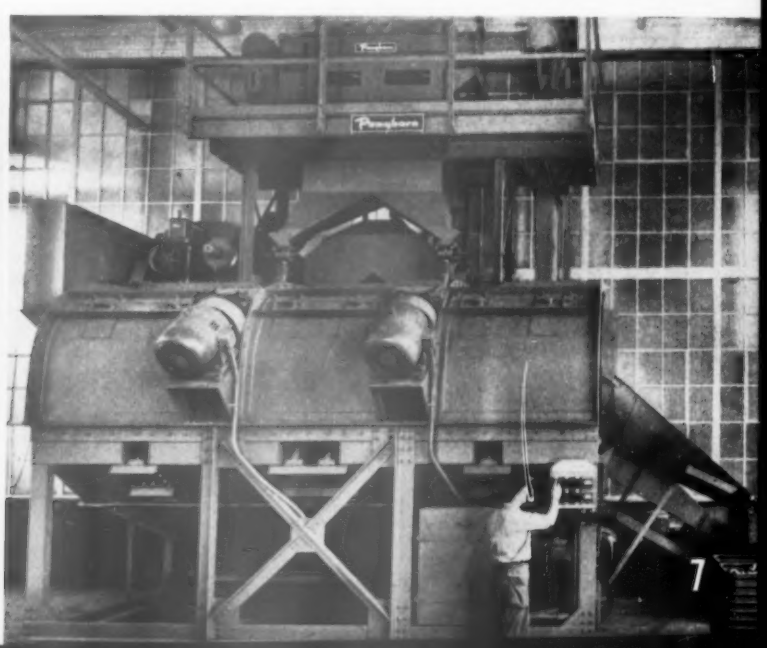
(6)—Oven: Despatch Oven Co., 619 S. E. Eighth St., Minneapolis—Self-contained all-purpose drawer type oven is factory wired and shipped assembled for inexpensive installation. Unit fan and heater are enclosed in an insulated box mounted on top of oven body. Vertical support bar is said not to interfere with loading from any angle. Overhead rail suspension of cast iron rollers permits smooth, easy drawer action, and rear plug on drawer seals oven against heat loss when drawers are open. Ovens are available in 24 standard models of 3, 4 or 5 drawer types, gas, oil or electric fired, forced convection. Drawers range in size from 30 x 36 in. to 48 x 72 in. with depths from 8 to 18 in.

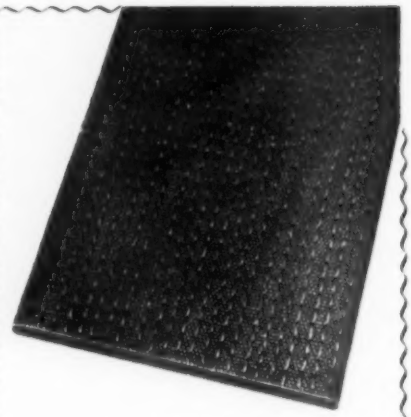
(7)—Blast Machine: Pangborn Corp., 1400 Pangborn Blvd., Hagerstown, Md.—Blast machine for continuous cleaning of castings consists of three rotary drums with slat conveyors between them for transfering work from drum to drum in sequence. Blast wheels are located between the drums but outside the barrel and project blast streams against castings parallel to the work flow. First and second drums are blast compartments fitted with flights to lift, cascade and progress the work forward through the drums. Third drum is an abrasive shakeout and discharge unit. All drums and conveyors are driven with one drive. Abrasive reclaimer is built integral, and ventilating air to support exhaust system is drawn in from both feed and discharge openings. Work is loaded continuously; mechanical handling equipment for feeding work to and from the machine can be provided.

Belt Idler: Koppers Co. Inc., Koppers Bldg., Pittsburgh 19—Adjustable troughing idler for conveyor belts is said to make possible practically tailor-made idler installations to fit the conveyor belt and provide any suitable depth of trough. Outer inclined pulleys are adjustable from slightly above the horizontal up to an angle of 25 degrees. This adjustable idler design is said to be well suited for use at locations on conveyors where any inclined belt changes to a horizontal path. A suitable number of adjustable idlers can be used to form a vertical curve and provide the shallowest depth of trough necessary to retain the material without spill. Belt may be troughed or flattened gradually thus reducing strain on the belt.

Remote Control: Askania Regulator Co., 240 East Ontario St., Chicago 11—An automatic electronic remote control and positioning unit for the control of valves, dampers and other mechanical mechanisms consists of three basic units which can be combined in a variety of ways to produce systems to meet many industrial remote control needs. System consists of a transmitter from which point any desired position of a remote receiver can be selected; control amplifier which responds to the setting of the transmitter and controls the supply of power to the receiver, and a receiver which moves a load to the selected position. All units are encased in dust-proof cast metal cases designed to withstand shocks, vibration, corrosion and other







Sahara Heat-Resisting Belting

Wears Longer!

For almost 40 years, foundries have been using Sahara Belting because it is unexcelled for conveying and elevating hot materials.

STANDARD SAHARA is for handling materials up to 300° F. INSULATED SAHARA, combining asbestos and special insulating material with the cotton base, is for use where sustained temperature of materials is from 300° F. to 450° F.

The effective heat-resisting qualities of Sahara Belting is due to special impregnation and insulation. The base of both Standard Sahara and Insulated Sahara is a 37½ ounce, tight-woven duck having a tensile strength exceeding 700 lb. per inch of width. Our double-stitched and Inner-Locked construction is employed to permanently prevent ply separation.

Write for our new folder 47-8 on Sahara Heat-Resisting Belting.

Imperial INNER-LOCKED BELTING

Imperial Belting Co.

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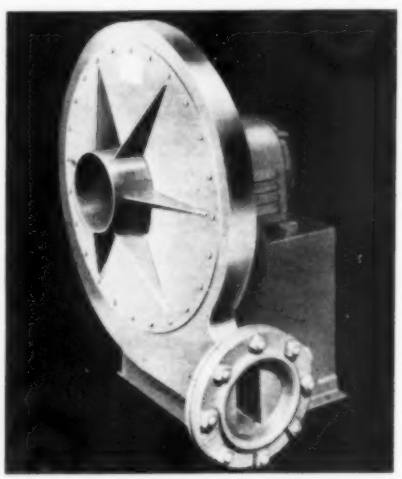
Engineered Belting—
The Right Belt for Each Job

tough industrial operating conditions. Signal lamps and/or audible warning signals are available to indicate position and direction of travel of the controlled equipment.

Motors: Allis-Chalmers Mfg. Co., 1126 South 70th St., Milwaukee 1—Totally enclosed, fan cooled, wound rotor motors are built with a tube-type air-to-air heat exchanger. To assure trouble-free operation under unfavorable atmospheric conditions, the motors can be built with stainless steel ventilating tubes, fans and end plates and cast iron terminal boxes and collector ring enclosures. Motors are of simple design and are easy to clean, it is claimed.

Centrifugal Blower: Combustion Systems, Division of Vapofier Corp., 10316 South Throop St., Chicago 43—Centrifugal blower has flanged discharge complete with a companion flange which permits direct attachment to combustion equip-



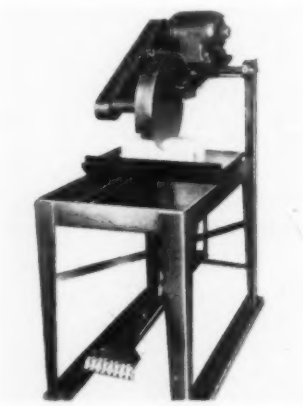
ment, eliminating need for couplings or unions. It is designed to furnish air at high pressures for industrial applications requiring a steady, non-pulsating air pressure or suction. Front plate of the blower is reinforced with triangular gusset plates said to eliminate transmissional vibration and "breathing" thus reducing the noise level during operation. Company also makes exhausters for high temperature air recirculation, removal of dust and materials or for heating, ventilating and air conditioning systems.

Welding Rods: Eutectic Welding Alloys Corp., 40 Worth St., New York 13—Four new gas welding rods are said to produce strong, completely homogeneous welds on brass at temperatures as low as 334° F. Rods are designed for wrought and cast brass production, repair and maintenance, utilizing the principle of surface alloying at low base metal heat, and are said to produce welds of high tensile and shear strengths, good color match, corrosion resistance and good electrical conductivity. They are of two general classifications—thin flowing and bead forming.

Welding Helmet: Willson Products Inc., 237 Washington St., Reading, Pa.—Lightweight welding helmet has special formula lens and

is available in 12 different shades to meet requirements of various jobs. Clear cover glass protects welding glass from pitting. Both lenses are said to be easily removed and inserted. Helmet is made of one-piece vulcanized fiber, riveted at overlapping seams, and, when in place, it extends below and under the chin as well as over the ears. It weighs 19 oz, has adjustable headgear, replaceable leather sweatband, is well balanced and can be swung off the face for quick inspection of work.

Masonry Saw: Champion Mfg. Co., 2028 Washington Ave., St. Louis 3—Masonry saw is designed to be used as a wet cutting or dry cut-



ting saw for fast and accurate cutting of all types of masonry and ceramic materials. Cutting head can be controlled by a foot pedal or locked down tightly for cutting or scoring. Machine has a self-contained water system, requiring no

(*Continued on page* 280)

"Foundry Equipment Arranged to Your Individual Requirements"

What JEFFREY Makes:

MOLD CONVEYORS
FLASK FILLERS
AERATORS
SANDITIONERS
PADDLE MIXERS
SCREENS
BIN VALVES
CONVEYORS
BUCKET ELEVATORS

A Jeffrey apron conveyor used for sprueing and sorting castings.

A typical view of Jeffrey sand handling and preparation in a large foundry.

-Here again,

Jeffrey-Equipped means Efficient Operation

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Complete Line of Material Handling, Processing and Mining Equipment

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Baltimore 1	Buffalo 2	Cleveland 13	Harlan	Jacksonville	Pittsburgh 22
Birmingham 3	Chicago 1	Denver 2	Houston 5	Milwaukee	St. Louis 3
Boston 16	Cincinnati 2	Detroit 13	Huntington 19	New York 7	Salt Lake City 1
				Philadelphia 3	Scranton 3

13

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when it means 13 ways of saving money!

Foundries Materials Co. offers 13 different, useful products that you can put to work in your foundry . . . and each one is designed to cut costs. Here are the 13 products:

- **AKRO COMPOUND**
- **NATIONAL FOUNDRY BENTONITE**
- **FMC— ALUMINUM BOTTOM BOARDS AND CORE PLATES**
- **ALLBOND CEREAL BINDER**
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- **FIRE BRICK**
- **FIRE CLAY**
- **SCIOTO FIRESTONE**
- **MILL STARS**
- **CORE & MOLDING SANDS**
- **SEACOAL**
- **SHOT AND GRIT**
- **SILICA SANDS**

and:

ALUMINUM BOTTOM BOARDS

FMC aluminum bottom boards have been engineered to take rough handling. Adequately reinforced by sturdy ribbing, they have proven their ability to withstand normal foundry usage. Perforations are provided in the plate assuring ventilation of the mold, yet are so installed that the strength of the plate is unimpaired. Aluminum bottom boards will pay for themselves in a few weeks.

Just-a-minute delivery by fast trucks or plane. FMC means FOUNDRIES MATERIALS CO. See FMC. Buy FMC. Call or write today.

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Detroit Office: 5735 Cass Ave. Phone: Madison-8921

(*Continued from page* 278)

outside hose connections or drains and contains a self-priming centrifugal pump equipped with a rubber impeller designed to pump dust and grit picked up by the coolant. Motor is rated at 1½ hp, belts are covered and blade guard is hinged so that it may be thrown back for installation or removal of the blades.

Belt Idler: Continental Gin Co., Industrial Division, 4600 Tenth Ave., Birmingham 2—Self-aligning belt conveyor idler is designed for

troughed, flat and return belts, and is said to be interchangeable with practically all standard idlers now on the market. Construction features include heavy duty Timken bearings on the 1¼-in. swivel shaft; all grease pipes extended to one side for ease and safety of lubrication; hydraulic fittings as standard equipment, with others offered if required.

Temperature Controllers: K. H. Huppert Co., 6830 Cottage Grove Ave., Chicago 37 — Available with or without pyrometers, these step-less input temperature controllers are suitable for electric and gas

furnaces, ovens, pots and other similar applications. During operation, only a small portion of current is allowed through the heating elements, an amount sufficient to maintain definite temperatures. Since no resistance is used, no current is wasted, it is claimed. Gas equipment is controlled through a solenoid valve. All models operate on 115 v ac (220 v units on special order).

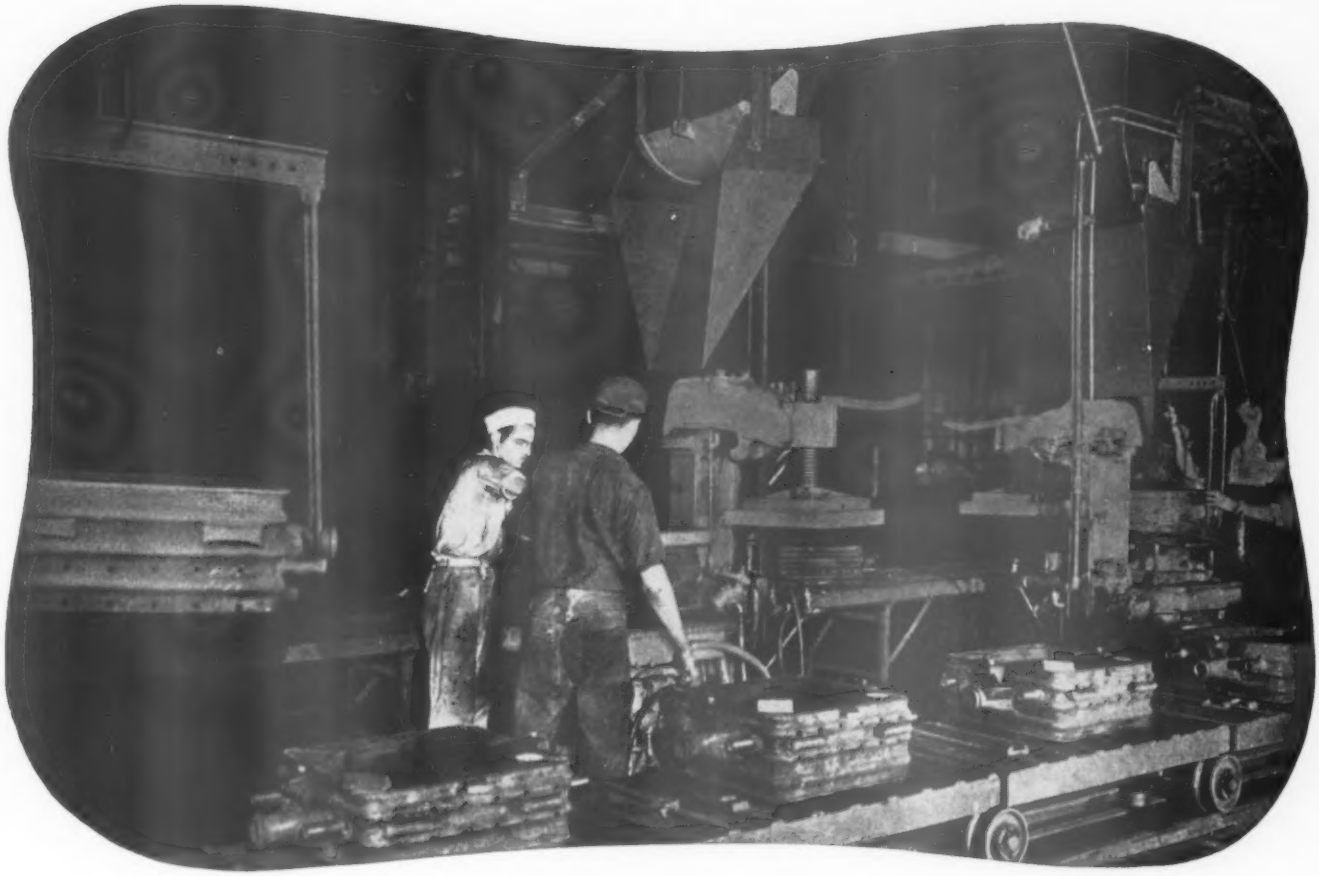
Lubricant: Carbide & Carbon Chemicals Corp., unit of Union Carbide & Carbon Corp., 30 East 42nd St., New York 17—Synthetic lubricant for use on bearings and other parts of machines operating at high temperatures is said not to oxidize, polymerize or decompose thermally to form sludges and varnishes or carbonaceous residues. Down time due to clogged or stuck bearings is reduced and machine service life increased it is claimed.

Goggles: American Optical Co., Southbridge, Mass. — Goggle is recommended for protection against impact hazards encountered in such

foundry work as melting, pouring, chipping, grinding, babbitting, riveting, hand tool operations and machine operations. It is available in two sizes with clear or Calobar lenses in medium, dark or extra dark shades. Features include a corduroy binding around the edge of the leather mask for extra comfort and better fit and wire screen ventilators around the eyecups to help keep lenses from fogging. One-piece rubber headband is designed for quick and easy adjustment.

Fan: Chelsea Fan & Blower Co. Inc., 1206 Grove St., Irvington, N. J. —Fan may be used for equalizing temperature and humidity and is especially adaptable to processes requiring speed-up cooling by air blast or which may require additional warm air. It can be floor mounted without additional support, or can be suspended at any location and at any angle. Totally enclosed motor is fitted with ball bearings, fan blades are steel and unit is equipped with safety guards front and back and an

(*Continued on page* 282)



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Save your men the tiring, tedious work of lifting, bending, shoveling with Bartlett-Snow foundry equipment,—and you'll reduce your own headaches too. Individually engineered to your particular and individual requirements, based on our long and successful experience in this work, a Bartlett-Snow installation will give you a maximum of both quantity and quality from your plant. Costs go down. Your product finds readier sale. The workmen get larger take home pay—easier—like their jobs better. Absenteeism and turnover are much reduced. And the smoother, more even, more continuous production means bigger profits, larger dividends for you. Can we send you more details?

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Reduces Chill!
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An amorphous graphite readily absorbed by iron.

A graphitizer. Used as a ladle addition, it reduces chill.

A carbon raiser for malleable and steel furnaces.

Made in 3 sizes to fit your jobs.

MEXI-LUMP

Large sized lump, high carbon, amorphous graphite for cupola additions.

Just the type and size for quick carbon pick-up, during the pig iron shortage.

Write us for detailed information for using FERROGRAPH and MEXI-LUMP.

The Smith Facing & Supply Co.
1857 Carter Rd., Cleveland, Ohio

(*Continued from page* 280)

extension cord and plug. The 20-in. fan delivers 3000 cfm and the 24-in. fan, 4800 cfm.

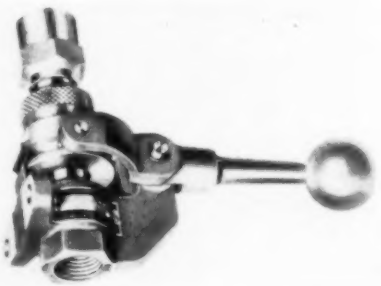
Backstop: Falk Corp., 3001 West Canal St., Milwaukee 8—Backstop is designed to provide a positive method of preventing reverse rotation on conveyor lines, elevator head shafts, winches and on all applications where reverse rotation should not occur. Gripping action of the simple device takes place at the precise moment that forward rotation ceases, and the possibility of shock and strain is said to be reduced to a minimum. Unit is available in three sizes to accommodate shaft diameters from ¾ to 3¾ in.

Extension Cord Reel: Industrial Electrical Works, 1509 Chicago St., Omaha 2, Nebr. 122—Portable extension cord reel is designed

to save time and cord and to speed work on any application requiring extension cords. Cord guide which level-winds the cord as it is rewound on the reel is designed to prevent kinks and simple knots, and a substantial base and the low set cord guide are said to prevent tipping. Ball-bearing swivel provides automatic alignment of reel and cord with operator as cord is drawn from reel. Current is transmitted through a double-constant contact collector ring built into the reel. An adjustable brake and lock controls reel rotation. Unit handles up to 400 ft of cord, depending upon cord diameter.

Flow Sight: Oil-Rite Corp., 3487 South Thirteenth St., Milwaukee 7—Flow sight is said to permit maximum visibility and assure dependable visual inspection of the flow of liquids from a distance. It may be used for gravity or pressure lines with flow of liquid downward through a nozzle on the inlet side. Flow control can be obtained by adding a regular globe, angle or gate valve. Drip nozzle orifices range from ⅛ to 9/16 in. diam. Sight diameters are 1½, 2 or 2½ in. with ⅛, ¼, ⅜, ½, ¾ or 1 in. female pipe threads. Sight cylinders are Lucite, and for applications where temperature exceeds 150° F, glass can be furnished.

Air Valve: C. B. Hunt & Son Inc., Salem, O.—Three-way, neutral position hand-operated valve has



forged bronze handle, brass sleeve, stainless steel body, stainless steel adapter and forged bronze head fitted with a flat spring that indexes and holds the handle in on, off, and hold or neutral position. Designed for use with single-acting air cylinders, the valve is recommended for use with hoists or other applications where it is desired to raise, lower, and hold the load in an intermediate position. It is furnished in ⅜ and ½-in. pipe sizes for air pressures up to 250 psi.

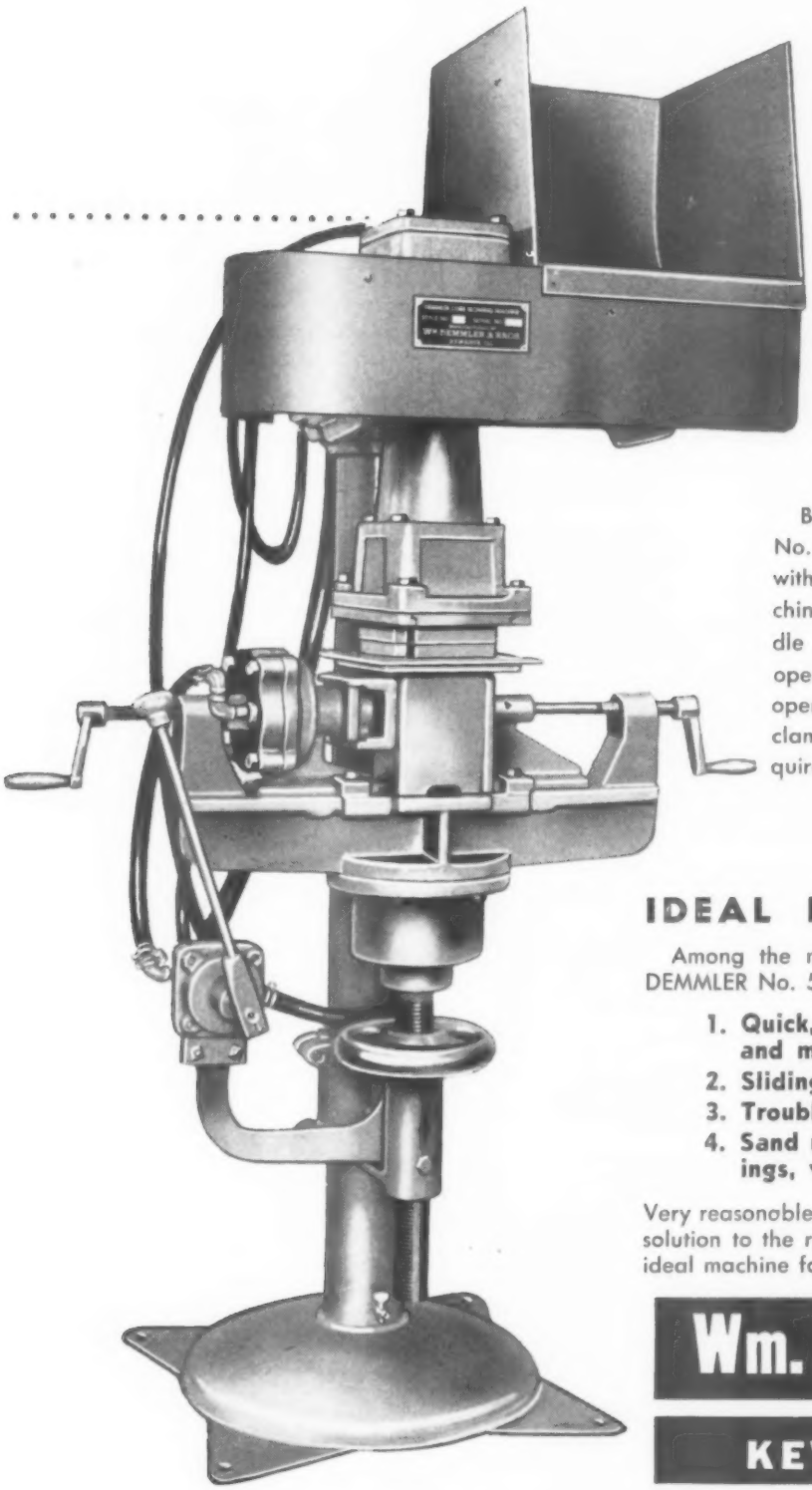
Pallet Truck: Lyon-Raymond Corp., 4690 Madison St., Greene N. Y.—Standard pallet hydraulic lift truck having a lowered height of 3¼ in. is equipped with a ramp and winch arrangement for handling heavy cases weighing up to 6000 lb. By means of the winch and cable, a case is drawn up the ramp and on the truck

platform for transportation. The load is wheeled into position and the truck is elevated 4 in. Blocks are placed under the overhanging sides of the case, the truck is lowered and removed and the case rests on the supports. Ramp is hinged and easily

(*Continued on page* 284)

DEMMLER Core Blower

NO. 55



A FAST CORE BLOWER EVERY FOUNDRY NEEDS AND CAN AFFORD

Because of its many features, the new Demmler No. 55 Core Blower was quick to gain popularity with foundrymen everywhere. This versatile machine will accommodate boxes 9 inches long—handle cores weighing up to 3 pounds. Sand magazine opening is 4½ by 9½ inches. A single hand valve operates both vertical and horizontal core box clamps and blows the core. Only 3 seconds required for complete cycle!

IDEAL FOR SHORT RUN JOBS

Among the many high quality features found on the new DEMMLER No. 55 are:

1. **Quick, easy adjustments for raising the table and moving chuck jaws.**
2. **Sliding, quick change blow plates**
3. **Trouble-free diaphragm type blow valve**
4. **Sand magazine and carriage of aluminum castings, with ball bearing rollers**

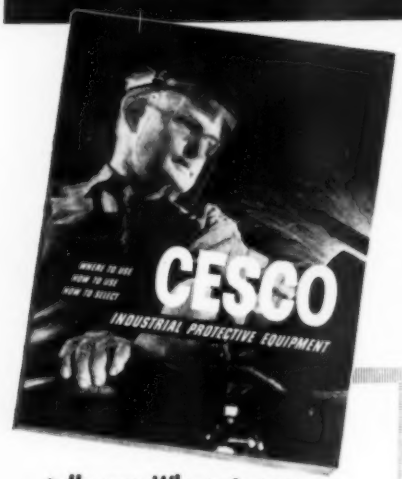
Very reasonable in price, the DEMMLER No. 55 is the economical solution to the rapid production of high quality small cores—an ideal machine for any foundry whether large or small.

Wm. Demmler & Bros.

KEWANEE, ILLINOIS

SEND FOR ILLUSTRATED SPECIFICATION SHEET

NEW CESCO CATALOG



tells you Where to use . . . How to use . . . and How to Select Industrial Protective Equipment

● This **NEW** CESCO Catalog is "industry's guide to accident reduction." That's what safety men who have seen it say. It completely explains and illustrates how to buy and how to use industrial protective equipment. All technical information is based on reports from impartial experts. Much of it applies to all protective equipment, regardless of make.

***64 PAGES** of ammunition against industrial accidents! Sixteen pages explaining correct safety procedures . . . over 150 protective items are illustrated and described throughout the book.*

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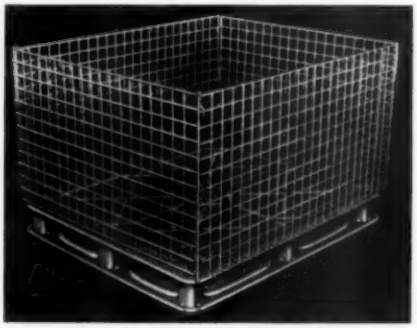
OFFICES IN Boston, Buffalo, Cincinnati, Cleveland, Columbus, Detroit, East Orange, Houston, Los Angeles, Montreal, Pittsburgh, Seattle, St. Louis, St. Paul, Toledo, Tulsa

CESCO FOR SAFETY

(*Continued from page* 282)

removed, and the winch is furnished with 15 ft of steel cable.

Collapsible Box: Monroe Auto Equipment Co., 1400 East First St., Monroe, Mich.—Collapsible pallet box utilizes the company's eight-way, all steel, 40 x 48-in. pallet as a base

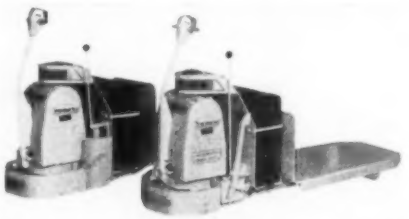


and has 8-gage steel wire sides 24 in. high. When box is not in use the wire sides fold down on top of the pallet, forming a unit 7 1/2 in. deep. Box will hold 2500 to 5000 lb in single loads and 15,000 to 35,000 lb in tiered loads for which stakes are available. Cubic content of the box is nearly 27 ft. It is available with pallets weighing 96 or 69 lb. Complete box on the heavier base weighs 169 lb and on the lighter base, 142 lb.

Hoist: Harnischfeger Corp., 4405 West National Ave., Milwaukee 14—Lightweight hoist has lifting capacity of 250 lb and is said to position work accurately within a fraction of an inch. Loads can be halted instantly

and held indefinitely anywhere. It is equipped with wire rope, push-button control, crane-type limit switch, double brakes and with transformer where line voltage exceeds 110 v so operator handles only 110 v at push-button. Other hoists are available with ratings up to 2000 lb capacity.

Hand Trucks: Automatic Transportation Co., 149 West 87th St., Chicago 20—New models of the company's motorized hand trucks, available with electric or foot lift, are shown here. The foot lift model has a new hydraulic lift pump development which combines a low pressure cylinder for raising the platform or forks into contact with skid or pallet and a high pressure cylinder for raising the load. New pump is said to reduce by an average of one-third the foot pressure necessary to lift loads into moving position or maximum height. Features of both models include a double position brake applied either by raising or lowering the guide handle, easy accessibility of all parts within the motor and pump, and simplified arrangement of all controls so that they may be operated virtually simultaneously and with one hand, except on the foot lift model where foot pressure is used for the lift. The trucks are available in 4000 and 6000-



lb capacity platform models and 3000 and 4000-lb capacity pallet models, and in a variety of special models.

Vibratory Feeder: Syntron Co., 540 Lexington , Homer City, Pa.—Heavy duty electric vibratory grizzly feeder is specially designed for the large capacity separation of crusher feeds, supplementing the company's three other models. All models are available with either single or double magnet, with the magnets mounted above the deck or below, and include variable control of rate of feed and either full or partial grizzly decks.

Production Control: Spiral Mfg. Corp., 3612 North Kilbourn Ave., Chicago 41—Motor driven business management machine is said to permit efficient and accurate control over production, inventory, purchasing and other plant operations. Machine consists of a graph chart on rollers, driven by an electric motor. Finger-tip control permits the chart to be rotated in either direction, at variable speeds or stopped at any position. Operating data such as stock on hand, material on order, in-

(*Concluded on page* 286)

ANNOUNCING...

A RESEARCH AND ADVISORY SERVICE ON PROBLEMS RELATING TO

CORE BLOWER BOX DESIGN

***We invite you to send your core blowing problems to us . . . if our years' of experience don't provide the answer, we'd like to study the problem and find the answer!**

FOR INSTANCE

Through research and experience, we have found that core box maintenance has been reduced as much as 300% through the proper design and the application of our *Seal-Tite Ribbing*.

The Abrasive Resistance of Various Metals **has had our careful study so that we can tell exactly what to expect when a core box is put into production. The accompanying table shows the relative resistance to abrasion of fifteen materials which have been tried in core box construction.**

BLAST RESISTANCE TEST RESULTS

Material No.	Efficiency
1	145%
2	135%
3	100%
4	76%
5	70%
6	63%
7	50%
8	50%
9	44%
10	42%
11	41%
12	35%
13	32%
14	20%
15	10%

If you aren't getting the core box life you think you should or if you are planning new core box equipment, we invite you to ask for our Advisory Service. We will welcome the opportunity to give you the benefit of the specialized experience and research which we have devoted to these problems.

New BULLETIN on Core Blowing

*** Scheduled for publication in the near future is our new Bulletin "F" on Core Blowing which will contain considerable information of practical value. We invite you to write for a copy to be sent as soon as it is off the press.**

INDUSTRIAL PATTERN WORKS

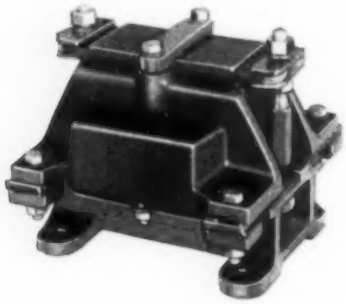
PATTERNS FOR PRODUCTION—PATTERN ENGINEERING SERVICE

2600 BELMONT AVE., PHONE: IRVing—0413 CHICAGO 18, ILL.

SYNTRON

"Pulsating Magnet"

ELECTRIC VIBRATORS



Keep Bins, Hoppers and Chutes Open and Free-Flowing

—by controlled, pulsating vibrations that penetrate the mass—activate each particle and break down arching and plugging.

Eliminate hammering and pounding.

Manual control—or automatic control as pictured above, with a mercury switch tied in the vibrator circuit and mounted on the gate handle. Starts the Vibrator when the handle is pulled down—stops it when the handle is pushed up.

Write for illustrated folder.

SYNTRON CO.
540 Lexington, Homer City, Pa.

(*Concluded from page* 284)

coming supplies, completed units, shipments, etc., are posted on the chart and can be referred to at a glance. Machine has capacity of up to 2000 separate items which can be posted in quantities from one to millions, it is claimed. Machine is mounted in a metal cabinet 36½ in. long, 13¾ in. deep, 11 in. high, weighs 84 lb and operates on 110 v ac.

Cylinder Opener: Nutmeg Industries, 45 Deacon St., Bridgeport 7, Conn.—Device facilitates the opening of compressed gas cylinders. It is a one-piece casting, readily fitted over the standard cylinder valve handle and tightened in place by a knurled set screw. With opener in place the main valve of the tank is said to be easily turned without recourse to a wrench for easy opening and tight closing.

Bench Grinder: United States Electrical Tool Co., Findlay St., Cincinnati 14—Bench grinder is

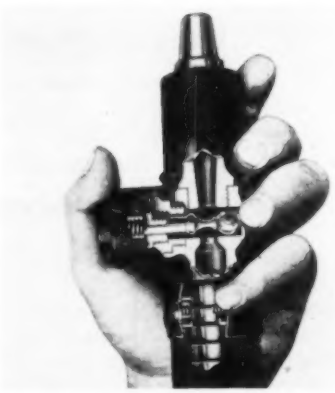
designed for general purpose grinding within rated capacity. Motor is 1/3-hp capacitor type, ball bearing, totally enclosed, 3450 rpm load speed. Grinder is equipped with one coarse and one fine abrasive wheel, 6 x 3/4 x 1/2 in.; tool rests adjustable to wheel wear and 7-ft rubber covered cable. It weighs 45 lb and can be furnished for 110 or 220 v, 50 or 60 cycle, 1, 2 or 3 phase ac.

Transformers: Westinghouse Electric Corp., 306 Fourth Ave., P. O. Box 1017, Pittsburgh 30—Dry-type transformers equipped with built-in primary circuit breakers and thermal protection against overloads are designed for supplying industrial lighting and small-power circuits from industrial power circuits. Complete in themselves, these transformers can be connected directly to open or conduit wiring eliminating the necessity of providing junction boxes, primary switches, fuses or circuit breakers. Ratings are available from 3 through 50 kva for 240 to 120-240 v, 480 to 120-240 v, or 600 to 120-240 v single phase, 60 cycles.

Drill-Reamers: Severance Tool Industries Inc., 753 Iowa St., Saginaw, Mich.—Drilling and reaming in one continuous stroke is said to be possible with these tools. Drill section of the tools provides for drill-

ing through materials of any thickness up to that equalling their diameter. Reamer section is designed to preclude chatter and expel the fine chips into the main flutes of the tools. They are suited to short, through holes where it is possible to complete the drilling function before the reamer section begins to finish. Drill-reamers come in the following diameters: 3/16, ¼, ⅜, ½ and 9/16 in.

Hose Valve: Paul Valve Corp., 683 Third Ave., New York—palm-size hose valve operates without springs and with only two moving parts—the operating plunger and the controlling ball. Hose nozzle is discharged by pushing a button causing the plunger to roll the ball off its seat, giving instant full flow. When push button is released, the difference in pressure between the center and the out-



side of the stream forces the ball into the valve throat where it is held against the seat by line pressure. Valve is available for standard hose sizes from ¼ to 1 in., delivering up to 13 gpm at 75 psi line pressure. It is made of Monel, including the ball and plunger, and the body is rubber coated to prevent scratching equipment being cleaned.

"IRONTON NOJOINT" for Foundry Ladles

Photo Courtesy—McNally Pittsburg Foundries, Inc.

"Ironton Nojoint" gives much longer service than regular fire brick or special shapes when used as a rammed lining in cylindrical mixing, receiving or desulphurizing ladles, especially when "Purite" is used. The solid, dense, monolithic lining is free of joints and cracks and is very resistant to molten iron and alkaline slags.

"Ironton Nojoint" is packed in 550 lb. steel drums to prevent drying out in storage, and it will remain moist and workable indefinitely. It is economical to use, and may be quickly and easily installed.

We offer you the assistance of an experienced engineer in installing your original lining and training your men to do the job.

THE IRONTON FIRE BRICK COMPANY

RELIABLE REFRACTORIES

IRONTON **OHIO**

USE

SCIENTIFIC
Pressure Cast
MATCH PLATES

SHARP
PARTINGS
•
ACCURATE PATTERN
DUPLICATION
•
LOWER COSTS

The
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Corp.

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CLEVELAND 3, OHIO
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CHICAGO 12, ILLINOIS

...TRADE PUBLICATIONS...

FURNACE: Sklenar Furnace & Mfg. Co., 38 Memorial Dr., Cambridge 42, Mass.—Circular describes functions and scope of an improved reverberatory melting furnace. Utilizing a distinctive process in melting iron or nonferrous metals, the furnace is said to permit savings in time, fuel and labor and to operate with low metal loss. Photo diagrams show the principle of operation; tables show the melting rates and capacities.

REFRACTORIES: Carborundum Co., Refractories Division, Perth Amboy, N. J.—Booklet describes the physical characteristics of the company's super refractories for heat treatment furnaces. Dimensions of standard brick, plain tile, tongue and groove tile, jointed tile and pyrometer protection tubes are given. Information on refractory cements is included. Booklet contains many illustrations of installations in various types of furnaces.

COUPLINGS: Baldwin-Duckworth Division of Chain Belt Co., 369 Plainfield St., Springfield 2, Mass.—Bulletin 48-6 presents design, application, selection and price information on company's roller chain flexible couplings. Cutaway photos and simple drawings are used. Diagrams of five types of shaft misalignment are shown, and a group of charts aids in the selection and ordering of couplings.

INOCULANT: International Nickel Co. Inc., 67 Wall St., New York 5—Booklet describes an inoculant known as Nisiloy used in the production of gray iron castings. It contains nickel and silicon and is said to aid in producing dense, sound castings of uniform properties and to improve machinability. Illustrations of typical castings made with the use of the inoculant are shown.

CONTROL EQUIPMENT: Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4—January issue of "Foundryman's News Letter," periodic publication of the company, deals with moisture in core baking, a new development in carbon control, AFA tentative fineness test, sulphur determination and the company's dual-accelerator for preparing samples for sulphur analysis by combustion.

RUBBER PRODUCTS: Manhattan Rubber Division, Raybestos-Manhattan Inc., Willett St., Passaic, N. J.—Condensed catalog describes mechanical rubber products and special items manufactured by the company. Particular emphasis is given transmission and conveyor belting, V-belts, hose, engineered molded products, rubber roll coverings, tank linings and abrasive wheels.

HAND TRUCKS: Rapids-Standard Co. Inc., Dept. W-156, 342 Rapistan Bldg., Grand Rapids 2, Mich.—Bulletin WE-45W illustrates and describes company's hand trucks and lists specifications. Four styles of hand trucks are shown on the back side of the bulletin, and five types of wheels which may be specified are illustrated and described.

SPEED CHANGERS: Link-Belt Co., 2045 West Hunting Park Ave., Philadelphia 40—Book 1874 with supplemental folder 1874-A gives dimensions, weight, ratios, horsepowers, torque ratings and list prices of the company's gear variable speed changers ranging from ½ to 15 hp capacity with ratios up to 6:1.

BRONZE ELECTRODES: Ampco Metal Inc., 1745 South 38th St., Milwaukee 4—Bulletin W-17 explains welding technique and procedures for the company's bronze electrodes and offers a weldability chart showing diverse types of applications with recommendations as to which electrode to use in each case.

X-RAY FILM CHART: X-ray Division, Eastman Kodak Co., 343 State St., Rochester 4, N. Y.—Conversion chart for x-ray diffractionists is designed to permit rapid calculation of exposures with films of varying characteristics of speed, contrast and graininess.

TRUCKS - TRACTORS: Clark Equipment Co., Tructractor Division, 258 Champion St., Battle Creek, Mich.—Catalog presents the company's full line of gas and electric fork trucks, industrial towing tractors and special handling attachments.

COUPLINGS: Hansen Mfg. Co., 4031 West 150th St., Cleveland 11—Catalog 47 lists fluid line couplings, hose couplings, hose clamps, air-liquid cleaners and spray guns, and sand blast cleaners. Engineering data on couplings are included.

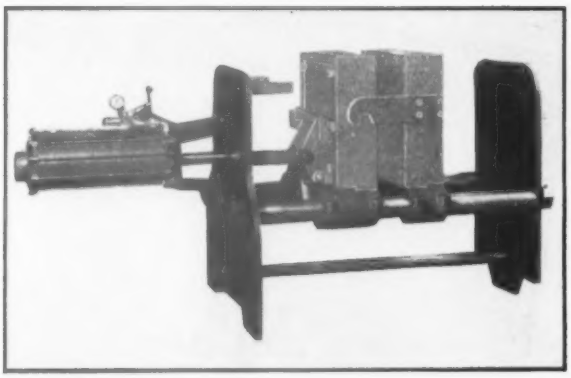
ELECTRICAL MAINTENANCE: Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30—Maintenance check chart for electrical equipment suggests regular inspection procedures for a preventive maintenance program.

PAINT: Speco Inc., 3142 Superior Ave., Cleveland 14—Booklet presents application directions and suggested uses for an antirust paint which, it is claimed, can be applied directly over rusty surfaces without wire brushing or scraping.

FIRE CLAYS: Illinois Clay Products Co., 68 North Chicago St., Joliet, Ill.—Illustrated booklet discusses the company's various plants, its products and its service to industry.

Attention!

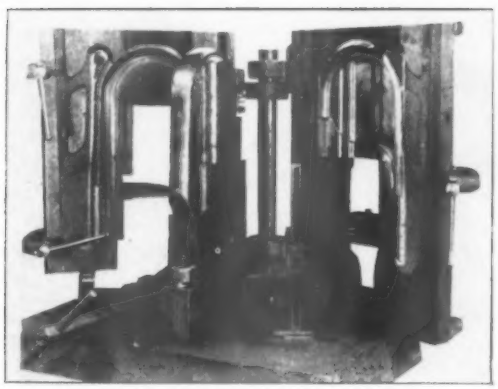
Buyers of Aluminum Castings



HAVE YOU CHECKED THE ADVANTAGES of the PERMANENT MOLD SYSTEM?

For suitable production castings, pneumatic permanent mold equipment gives you greater economy and speeds production. Another advantage of this kind of mold equipment is that the interchangeable custom built mold blocks can be quickly and easily bolted to this pneumatic table. The table itself is durable and simple in design and can be used continuously.

1. **More economical on production items.**
2. **Greater Production.**
3. **Improved casting quality.**
4. **Smoother and more attractive appearance.**
5. **Closer dimensional tolerance.**
6. **Less polishing and machining.**



For larger and more complicated types of castings the manually operated mold is most economical.

The permanent mold system of making aluminum castings is rapidly becoming more popular because of these advantages. Modernize your equipment by converting to permanent molds and using our pneumatic draw tables.

It is of utmost importance to have your permanent molds accurately and properly designed to suit the requirements of your foundry. This will enable them to produce castings with a minimum amount of effort and expense. The initial cost of this type of PROVEN AND DEPENDABLE mold equipment is quickly amortized in more efficient production.

SEND US YOUR BLUEPRINTS OR SAMPLE CASTINGS FOR QUOTATION.

YOUR INQUIRY WILL RECEIVE IMMEDIATE ATTENTION.

MASTER PATTERN COMPANY

1315 MAIN AVENUE — CLEVELAND 13, OHIO

DESIGNERS AND MANUFACTURERS OF PERMANENT MOLDS, WOOD AND METAL PATTERNS AND MODELS

★ Sharper Castings
★ Greater Brinell Hardness
★ Increase Tensile Strength
★ Increase Transverse Strength
★ Increase Wear Resistance
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Copper Shot

IMPROVES YOUR IRON

ALTER COMPANY Fifty Years of Service
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BLACKEN MOLDS

FASTER AND BETTER
with the
MURPHY PISTOL SPRAYER
ELIMINATES SWAB, BRUSH and SPRAY CAN

BLACKENING REACHES HIDDEN POCKETS
MOLDS ARE BLACKENED FASTER
CASTINGS PEEL BETTER
WORK COMES CLEANER
Satisfactory Performance Guaranteed or Money Back

PRICES COMPLETE WITH SUCTION HOSE AND SINKER

PIPE SIZE	1/16"	1/8"	1/4"	3/8"	1/2"
PRICE F. O. B. HAMILTON, O.	$12.00	$12.00	$12.00	$14.50	$18.00

Used for Silica wash, oil, water or any liquid material. For sand-blast cleaning. As a blow gun for cleaning motors and machinery. If your dealer cannot supply you at once, order direct from manufacturer below. Literature on request.

GUARANTEED COMPRESSED AIR PRODUCTS

AFTERCOOLERS • SEPARATORS • STRAINERS • TRAPS
SPRAY GUNS • PISTOL SPRAYERS

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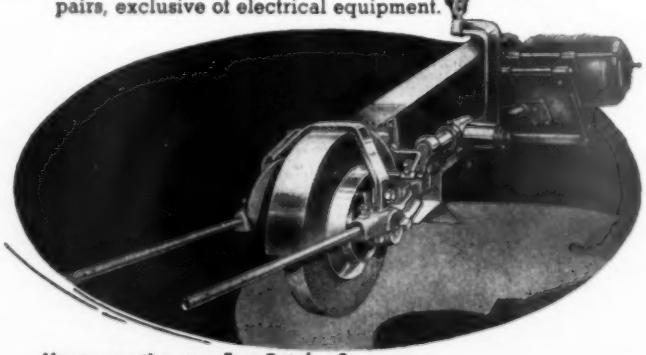
FIFTH AND VINE STREETS, HAMILTON, OHIO
Moisture Elimination Up To 3000 Pounds Per Square Inch

FOX

SWING FRAME GRINDER

- **BALANCE** Perfect center balance of wheel and motor ensures grinding ease and efficiency.
- **SAFETY** "Worker safety" is carefully provided.
- **ECONOMY** Greasing required only once every six months . . . guaranteed for two years against repairs, exclusive of electrical equipment.



Have you the new Fox Catalog?

FOX GRINDERS, INC.
OLIVER BUILDING PITTSBURGH 22, PA.

Experience Is An Excellent Teacher

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All Users Of

WATERLOX

PRODUCTS

Will Testify

TRY WATERLOX CASTING SEALER!

You can effect a great savings in time, labor and material by sealing castings with Waterlox Sealer and Impregnator.

Manufacturers of machinery and equipment for the Armed Forces learned how Waterlox speeds up production and eliminates waste and spoilage. Waterlox has proved successful on all types and all sizes of castings.

It will pay you to learn how to make Waterlox work for you in making peacetime products.

Technical advice will be furnished promptly by the manufacturer. Write today.

WATERLOX

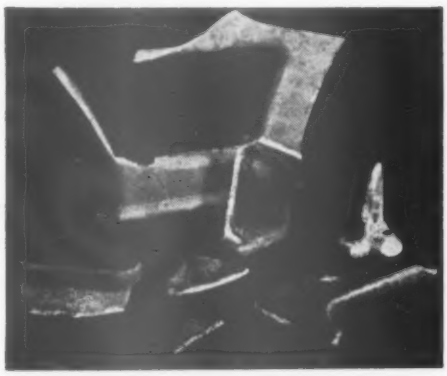
DIVISION OF

THE EMPIRE VARNISH COMPANY

2636 East 76th St. Cleveland 4, Ohio

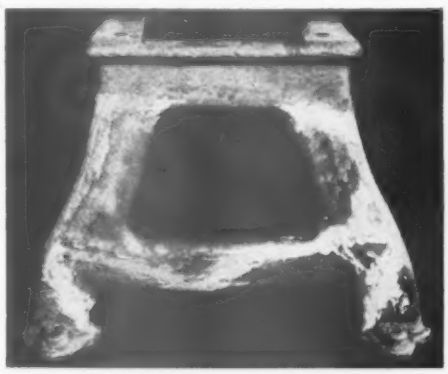
SCRAP IRON?

. . . not with NI-ROD handy



HERE'S WHAT one company received when they ordered a cast iron leg for an 18" lathe. Looks like a pretty hopeless repair job, doesn't it?

You'd think this breakage meant further long delay . . . lost production hours. But NI-ROD* saved all that.



REPAIRED IN SHOP with 5/32" and 3/16" diameter NI-ROD, the casting was quickly welded into its original form (as shown above) to function as good as new.

Here's what NI-ROD gives you *in performance*:

- STABLE ARC IN ALL POSITIONS
- SMOOTH BEAD CONTOUR
- EXCELLENT "WASH"
- EASY SLAG REMOVAL
- PREHEATING SELDOM REQUIRED
- WORKS ON EITHER A.C. OR D.C.

. . . and in weld quality

- HIGH-STRENGTH DEPOSIT
- EASY MACHINABILITY
- THOROUGH FUSION
- FREEDOM FROM CRACKS AND POROSITY
- CLOSE COLOR MATCH

FIND OUT how *you* can save minutes and money by making on-the-spot repairs with NI-ROD. Order a 5-lb. package today. Available in 3/32", 1/8", 5/32" and 3/16" diameters. EMBLEM OF SERVICE *Reg. U. S. Pat. Off.

SEND FOR INSTRUCTION BOOKLET

THE INTERNATIONAL NICKEL COMPANY, INC., 67 Wall St., New York 5, N.Y.

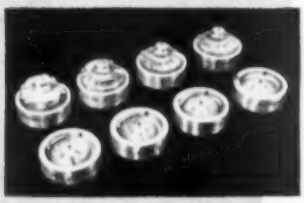
Name It...

ACME'S PATTERN DIVISION CAN HANDLE IT

Acme has the complete facilities to handle your entire pattern job with faster deliveries, greater efficiency. Typical large job is that illustrated above—cope and drag aluminum pattern equipment for diesel engine alternator stator frames. Cope half was machined in one piece; drag half machined in 8 sections and assembled on drag plate.

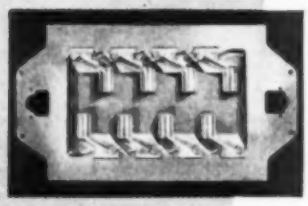
• Acme can take the complete assignment—any size or any quantity—from raw idea to finished castings. Make Acme your source for cope and drag plates—core boxes—match plates—precision castings in aluminum, brass, and bronze —etc. Our 18th year as pattern specialists.

Sand • Plaster • Permanent Mold



Interchangeable Pattern Inserts

Completely machined brass cope and drag pattern inserts for motor end frames. Hi-accuracy permits interchangeability.



Aluminum Match Plates

Single or multiple sections from one master pattern. Precision cast. Low clean-up time.

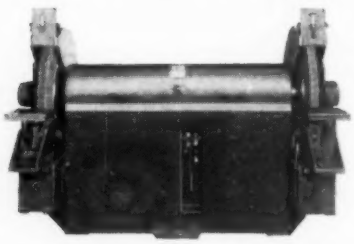
SEND BLUEPRINTS FOR PROMPT QUOTATIONS

PATTERNS by Acme

ACME ALUMINUM ALLOYS, INC.

212 N. Findlay St., Dayton 3, Ohio

Built for HEAVY DUTY



The Marschke Vari-Speed Grinder, the largest and most efficient of all heavy duty floor stand grinders, combines massive ruggedness with the dependability of accurately controlled wheel speed.

Constant cutting speed is automatically maintained by adjustment of the work rest to the wheel diameter. This machine may also be supplied as a Multi-Speed Grinder having three wheel speeds.

You'll want further information on the Vari-Speed Grinder or other Marschke Grinders which include pedestal and floor stand grinders and buffers, heavy duty Swing Frames and the "In-Between" Grinder.

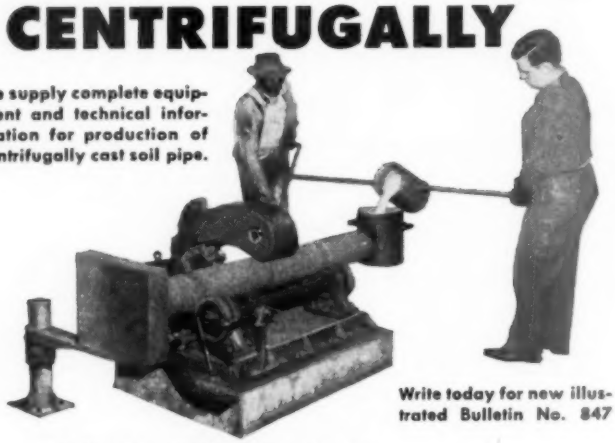
Write today for complete details

VONNEGUT MOULDER CORPORATION

1839 Madison Avenue — Indianapolis, Indiana

CAST SOIL PIPE CENTRIFUGALLY

We supply complete equipment and technical information for production of centrifugally cast soil pipe.



Write today for new illustrated Bulletin No. 847

This Modern Method Provides for:

- Production Uniformity
- Perfectly Concentric Pipe
- No Sand Blasting or Other Cleaning Necessary
- Use of Unskilled Labor
- Small Man-Hour Labor Cost
- High Production with Low Investment
- Pipe Sizes from 2-inch Diameter Upwards

CENTRIFUGAL CASTING MACHINE CO.

P. O. Box 947 — *Nathan Janco, Pres.* — Tulsa 1, Okla.

QUALITY • DEPENDABILITY • SERVICE
Producers of
PressureProof

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CHAPLETS
and all types of nails

The Angell Nail
& CHAPLET COMPANY

4580 East 71st Street Cleveland 5, Ohio

CLEANER CASTINGS

For 67 years we have sold Bloomsbury Quality Foundry Facings to America's leading foundries with never a complaint as to our claim for Cleaner Castings — if you use

EXCELLO PLUMBAGO BLACKING

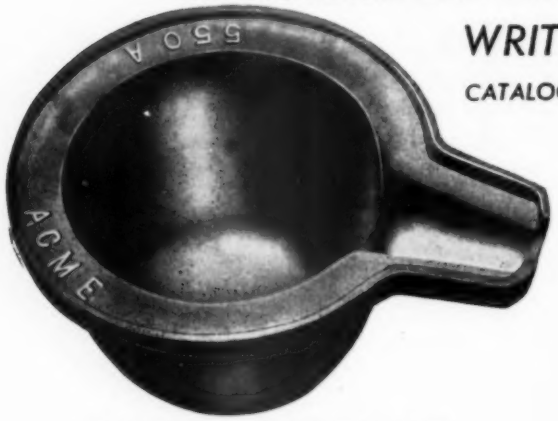
Send for a Liberal Sample for your Test

BLOOMSBURY GRAPHITE COMPANY SINCE 1882 AT BLOOMSBURY, N. J.

MELTING POTS—Ingot Molds

for ALUMINUM AND OTHER NONFERROUS METALS. 45 SIZES.

WRITE for CATALOG "F"



ROUND SPOUT POT NO. 550A
WITH 1½" COLLAR ON FLANGE

HOLDING——→
BOWL NO. HP7001

INGOT MOLD NO. AA-6

Made of Acme SPECIAL-M-Heat Resisting Iron — They Stand the Heat!

ACME FOUNDRY COMPANY

DETROIT 16, MICHIGAN

2502 TWENTY-SECOND ST. PHONE TASHMOO 5-2404

THERE'S ROOM ALOFT

If ground is too limited to scatter materials all over the lot, there's room upwards for storage in Neff & Fry super-concrete stave silos. It's better anyway to store flowable bulk materials out of the weather.

The construction of Neff & Fry storage bins assures service for a generation or longer with virtually no upkeep expense. The super-concrete staves are dense, smooth, enduring. They interlock to form strong, tight joints. Each tier is bound with high-tension steel hoops.

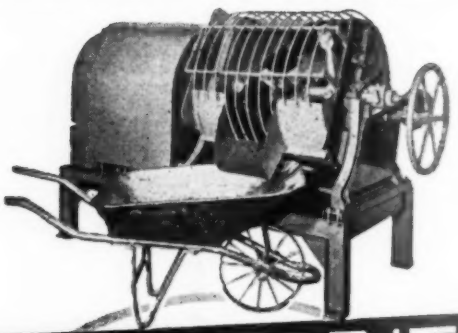
Hundreds of N & F bins are in use for storing cement, chemicals, coal, fertilizer, grain, gravel, lime, sand, sawdust, seeds, water, wood pulp, and numerous other materials.

Would you like to have our catalog which tells the whole story? A copy is yours for the asking.

THE
NEFF & FRY
COMPANY
CAMDEN, OHIO

SUPER CONCRETE STAVE

NEFF & FRY STORAGE BINS



BLYSTONE • MIXERS •

THE paddle-type mixer for core sand mixing in the foundry. Blystone Mixers offer: low mix cost, thorough mixing, and easy operation. There is a sturdily built type and size for your problem. Send for Bulletin and full details.

• BLYSTONE DIVISION •
STANDARD SAND & MACHINE CO.
549 W. Washington Boulevard, Chicago, Illinois

How to Give Bad Air the *BIG PUSH*

Swartwout Ject-O-Valve forces heat and fumes through your roof

. . . keeps workrooms "workable"

Wherever you have a situation that calls for a *big breeze* to get rid of heat, fumes, vapor or dust, Ject-O-Valve is the Roof Ventilator for the job. A scientifically shaped propeller fan, driven by an electric motor that costs little to run, opens the ventilator doors and literally *throws* your heavy load of bad air out and up to where the breezes carry it away. The top is open only when fan is running; the powerful air-stream keeps out all weather.

Well-proportioned, sturdily built, Ject-O-Valve is made in 5 sizes, 28 different capacities. There's one to fit *your need!* Mounts on any type of roof. Hinged top for easy servicing.

Overcome employee "griping" about fumes and heat. Install Ject-O-Valve to push bad air out of your plant. Write today for more information.

THE SWARTWOUT CO., *18566 Euclid Avenue, Cleveland 12, Ohio*

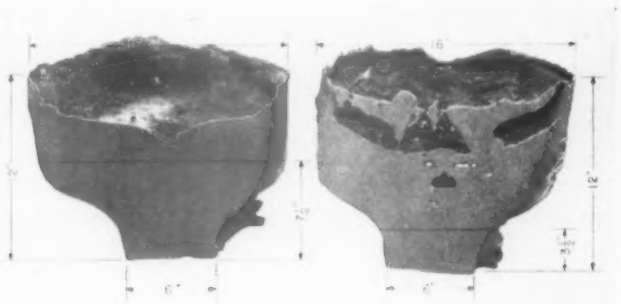
Swartwout *Controlled* Air Circulation

EQUIPMENT FOR EFFECTIVE ECONOMICAL VENTILATION OF INDUSTRIAL BUILDINGS

SOFFEL'S CARBON FREE *Liquidizer*

KEEPS METAL MOLTEN 50% LONGER

FOR FERROUS AND NON-FERROUS METALS



RISER ON LEFT CONTAINS TWICE AS MUCH SOUND METAL

These risers, made in the same mold, illustrate how Soffel's Carbon-Free Liquidizer produces sounder castings and saves metal. The riser on the left, on which Carbon-Free Liquidizer was used, contains more than twice as much sound metal as the riser on the right on which a common carbonaceous pipe eliminator was used. It is readily seen from this that the use of Soffel's Carbon-Free Liquidizer permits substantial reductions in size of risers.

SOFFEL'S CARBON-FREE LIQUIDIZERS have a two-fold action upon metal which prolongs the fluidity of feeding metal in risers. The exothermic action serves to raise the temperature of the feeding metal, and the heat generated is retained through the insulating properties of the material. When added in the pouring ladle, Soffel's Carbon-Free Liquidizer kicks cold, sluggish metal back to life and fluidity, raises the temperature of the metal, and removes occluded gases and oxides.

BEWARE OF IMITATIONS! WE ARE THE ORIGINATORS OF CARBON-FREE LIQUIDIZERS!

PITTSBURGH METALS PURIFYING CO.

"Fluxes and Purifiers for all Metals and Alloys"

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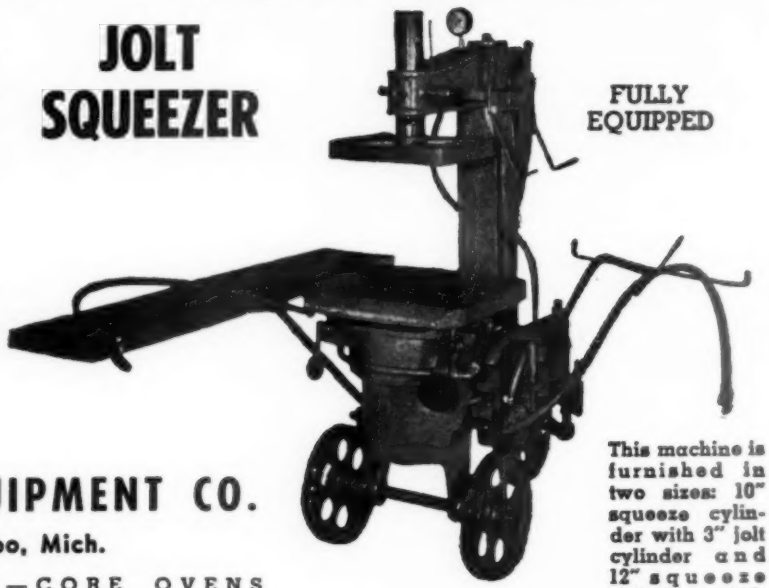
HAYNES EQUIPMENT

JOLT SQUEEZER

FULLY EQUIPPED

● The post and squeeze cylinder on the HAYNES JOLT SQUEEZER is cast all in one piece. There are no bolts or screws in this machine. The top of the post is machined on top with a 2 7/16" cold rolled shaft which the swing arm swings on.

This is a portable machine with three wheels, two in front, one in back, zerk fittings on all moving parts. Comes equipped with air gauge, pop-off gauge and a pin on top of the arm for a gate horn.



This machine is furnished in two sizes: 10" squeeze cylinder with 3" jolt cylinder and 12" squeeze cylinder with 4" jolt cylinder.

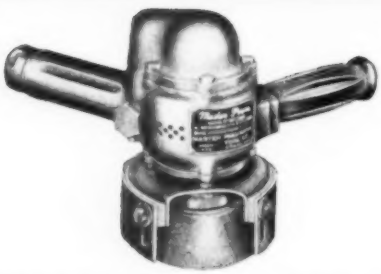
HAYNES FOUNDRY EQUIPMENT CO.

814 Ada Street—Kalamazoo, Mich.

LADLES—BRASS FURNACES—CORE OVENS

Master Power

HARD CHROMED • PORTABLE PNEUMATIC TOOLS



DO MORE WORK AT LESS COST

because they deliver more power per cubic foot of air consumed, are light in weight for easier maneuverability and they retain their new tool power longer.

ARE PREFERRED BY OPERATORS

because they are lighter in weight, better balanced and designed to reduce shock and be free from vibration.

IF YOUR PROBLEM INCLUDES

chipping, ramming, grinding, buffing, sanding or wire brushing, *write us today for full particulars.*

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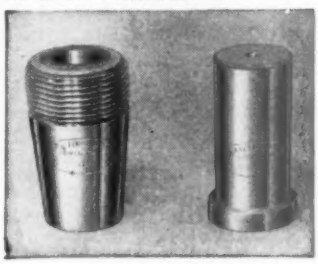
BLAST CLEANING NOZZLES

Saves AIR

Saves SHOT, GRIT SAND



FEDERAL BLAST NOZZLES ARE MADE OF

TUNGSTEN-CARBIDE

"The hardest material known to man." For this reason they outwear ordinary nozzles in use for sand blasting and metal cleaning by the blast method. Air consumption is reduced and the blast is *concentrated* because the hole in the nozzle wears very slowly. This means low cost operation.

TRY ONE AND SEE FOR YOURSELF—Made in all sizes and types: adapters furnished for all types of blast cleaning equipment.

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● *"Your guarantee of uniform quality since 1924."*

Prove to your own satisfaction by *actual trial*, what hundreds of foundries have discovered . . . that you get better cores at lower cost by using DAYTON CORE OIL. As a result, you get cleaner, more uniform castings. Our representatives are trained by years of experience to help you solve your core production problems. Order a drum of Dayton Core Oil . . . test it! We believe you'll want to use it exclusively thereafter.

"ASK THE MEN WHO USE IT"

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MAKERS OF DOCO BINDER & CORE PASTE • DOCO STEEL CORE & MOLD WASH

Why Morton's Salt Tablets to fight "heat fatigue"?

For years, industrial physicians and safety engineers have recommended salt tablets as low-cost insurance against the loss of efficiency and man-hours that "heat fatigue" causes. But it is vitally important that workers **accept** the salt tablets you provide them—are sure they are pure, reliable, safe.

Workers know Morton's Salt

Undoubtedly most of your employees use Morton's Table Salt in their homes. They know it is dependable and pure. So they accept Morton's Salt Tablets. They know they are a wholesome health aid backed by a familiar name.

Cost less than 1¢ a man per week

Morton's Heat Relief Salt Tablets—the best that money can buy—cost so little. Can you afford to be without "heat fatigue" protection in your plant? Order Morton's Salt Tablets and Dispensers from your distributor, or directly from this advertisement. Write for free folder. MORTON SALT COMPANY, 120 So. La Salle St., Chicago 3, Ill.

"Heat Fatigue" costs money!

Sweating robs the body of salt. This causes weariness—inability to work efficiently—and eventually, heat-cramps and prostration. "Heat fatigue" cuts down productivity, steps up absenteeism.

Morton's Salt Tablets act **fast** to replace lost body-salt—help keep production and efficiency at high levels. They're pleasant, easy to take, inexpensive.

Modern Plastic Dispenser. Practical, accurate, large size. 1000 tablet capacity $3.25

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Morton's Salt Tablets Case of 6000, 10-grain, plain salt tablets $2.10
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ATLANTIC Band Saws

The Favorite Blades of Non-Ferrous Foundries for Over 20 Years

You will profit by using the tougher Atlantic blades for clean, speedy cutting of gates and risers from castings. You can eliminate unnecessary grinding operations—our specially milled tooth construction makes it easier to cut closer to the body of the casting. All Atlantic Metal Cutting Band Saws are guaranteed as to material, workmanship and temper.

Send for Atlantic Band Saw Catalog,
describing foundry cut-off operations.

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Exclusively Band Saw Production

159 BREWERY ST.,
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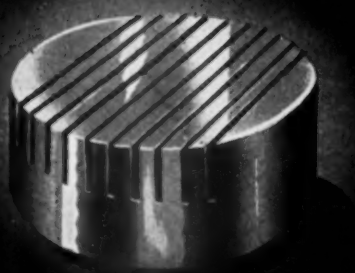
Precision



CORE BOX VENTS

Here's part of a complete line of DEMMLER core box vents—rigidly constructed in varying sizes of slotted brass—slotted steel—and screen mesh. Orders filled promptly from stock!

BRASS SLOTTED CORE BOX VENTS
Slot widths: .010", .013", .015"
Diameters: 1/8", 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1", 1 1/4", 1 1/2"

STEEL SLOTTED CORE BOX VENTS
Slot widths: .010", .013", .015"
Diameters: 1/8", 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1", 1 1/4", 1 1/2"

SCREEN TYPE CORE BOX VENTS
Mesh: #30, #40, #50.
Diameters: 1/8", 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1", 1 1/4", 1 1/2"

SPECIFICATION CIRCULAR ON REQUEST

Wm. **DEMMLER** *& Bros.*
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SAVE "DOWN TIME" AND REPAIRS

OPERATE AIR TOOLS WITH

CLEAN DRY AIR

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USE MURPHY SEPARATORS

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Employing four positive principles of separation, the Murphy "Type A" Separator carries a money-back guarantee to deliver clean, dry air to point of use. Completely automatic separation and ejection. No moving parts to receive wear. No filters to renew. Requires neither attention nor maintenance. Install it . . . and forget it; it's guaranteed. Write for literature and prices.

GUARANTEED COMPRESSED AIR PRODUCTS

AFTERCOOLERS • SEPARATORS • STRAINERS • TRAPS
SPRAY GUNS • PISTOL SPRAYERS

JAS. A. MURPHY & CO.
FIFTH AND VINE STREETS, HAMILTON, OHIO
Moisture Elimination Up To 3000 Pounds Per Square Inch

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ARE THE PERFECT ABRASIVE TEAM FOR FAST, ECONOMICAL BLAST CLEANING....
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GLOBE'S SPECIAL MANUFACTURING PROCESSES AND 37 YEARS OF METALLURGICAL EXPERIENCE ASSURE
UNIFORM SIZE.... UNIFORM HARDNESS....RUGGED DUSTPROOF PERFORMANCE....ALL
SIZES GRADED TO S.A.E. SPECIFICATIONS... FOR INFORMATION WRITE....
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GLOBE
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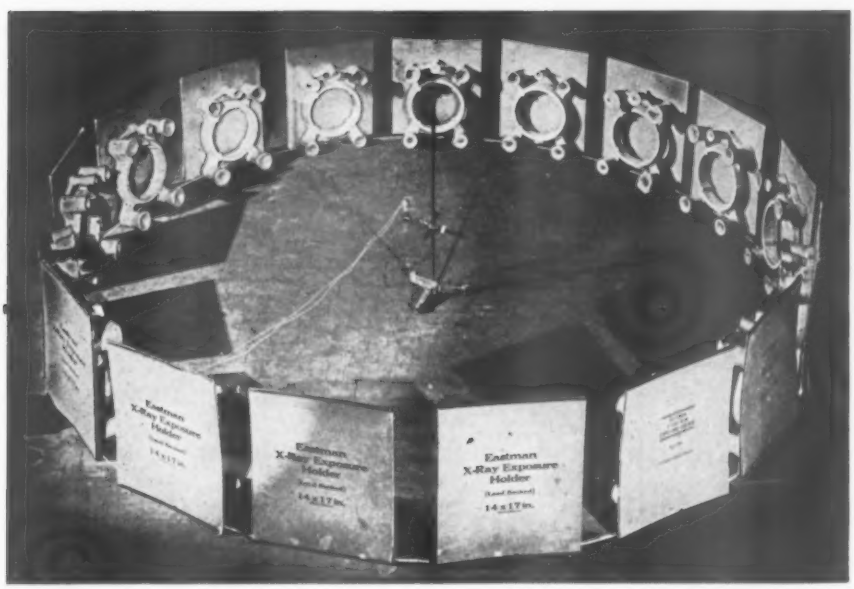
MANSFIELD, OHIO

RADIUM RADIOGRAPHY *Performs a* NEW FUNCTION



PHOTOGRAPH COURTESY OF CRANE CO.

Write us concerning any problem of Gamma Ray Radiography

"Directional solidification" can easily be studied by the set-up illustrated in the photoaraph—to indicate the best method of casting with a minimum of defects in the casting itself.

Radium has become a new foundry tool which directly effects an increase in yield. It permits accurate determination of the proper procedure in gating and risering "tough" castings. Seventeen cylindrical castings were radiographed simultaneously by Crane Co. to ascertain the most productive and economical foundry practice.

Radium thus performs a valuable additional function.

For inspection, for determination of directional solidification, Radium is available in capsules of various unit strength in duralumin holders which may be leased or purchased at low rates.

The rental includes full coverage insurance; heavy load storage containers and slide rule exposure calculators.

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CONTACT CONOVER

1948

Among foundries that have given us contracts during the 16 years we have been in business a new slogan is in use: it is "CONTACT CONOVER". This confidence in the Conover Engineering Co. is based on customer satisfaction. More than 50% of our business comes from previously satisfied customers. 90% of the demands for our services comes from foundries of all sizes and types requiring a complete foundry engineering service. Many of the foundries we serve prefer a yearly development plan; some prefer a 5 year plan, and in some cases even a 15 year plan. Here is what one of Cleveland's modern foundries has to say about our service: "This is to inform you that we have employed this concern every year for the past 15 years, and find them very satisfactory. They have not only taken care of us to our satisfaction, but their suggestions have saved us many dollars. At the present time they have just completed a survey of our Cleaning Room, and we are in the process of changing in accordance with their suggestions. We have the highest respect for their integrity." *

Conover Engineering Service has been used by foundries in 21 states. 12 firms, each operating several foundries, have given us repeat business; in some cases the work covered 3 years. More than half of the 35 firms we have served in Cleveland have offered us new contracts.

* NAME WILL BE FURNISHED UPON REQUEST

CONOVER ENGINEERING COMPANY

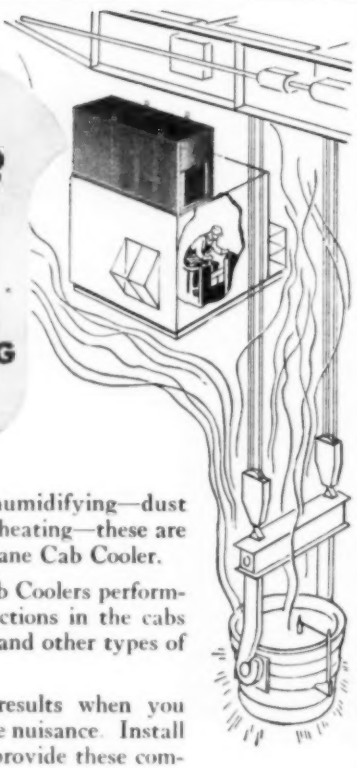
O. D. Conover, Consulting Engineer

6007 EUCLID AVE. PHONE: UTAH-1-0842

CLEVELAND 3, OHIO

DRAVO CRANE CAB COOLERS

PERFORM EVERY AIR CONDITIONING FUNCTION



Cooling—fume removal—dehumidifying—dust filtering—ventilating—winter heating—these are the functions of the Dravo Crane Cab Cooler.

You will find Dravo Crane Cab Coolers performing these air conditioning functions in the cabs of soaking pit, ladle, stripper, and other types of hot-metal cranes.

And you will observe real results when you eliminate heat fatigue and fume nuisance. Install Dravo Crane Cab Coolers to provide these comfortable working conditions in the cabs of hot-metal cranes.

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Light-weight parts for easy handling.
Oil reservoir for automatic lubrication.
Sturdy trigger . . . comfortable grip.
Simple main valve . . . long life.
Hollow piston rod for snappy action.
Valve in renewable bushing prevents leakage.
Exhaust deflector shields operator.
Simple packing adjustment maintains efficiency.

Cut costs with the NEW ROTOR RAMMER

Call in the Rotor Analyst to demonstrate the model to match your work.

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CLEVELAND, OHIO

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BY AMERICA'S LARGEST INDUSTRIAL PLANTS TO DO THE TOUGHEST BLASTING AND PEENING OPERATIONS

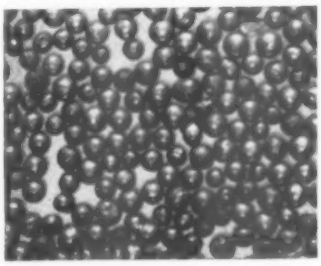
HI-GRADE METALLIC

FAMOUS

FOR ITS ABILITY TO STAND UP UNDER REPEATED HARD USE

SHOT

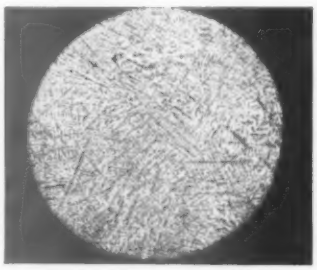
- ROUND
- UNIFORM IN SIZE
- UNIFORM IN HARDNESS
- LACKS IRREGULAR SHAPES



UNRETOUCHED PHOTO OF HI-GRADE SHOT

GRIT

- RECTANGULAR
- SHARP
- TOUGH
- DURABLE



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DETROIT 10, MICHIGAN

CEdar 7200

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FOUNDRY CONSULTING and METALLURGICAL SERVICE

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SERVICE TO OVER 50 YEARS INDUSTRY

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BENTONITE
highest FOUNDRY *quality*

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BENTONITE SALES OFFICE: RAILWAY EXCHANGE BUILDING, CHICAGO 4, ILL.

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WHO CALLED ON US
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DOUBLE YOUR PRODUCTION—with the fastest and most powerful Rammer made—

NO. 4 DAYTON
RING VALVE
BENCH
RAMMER

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Aside from its efficiency, the chief advantage of this Rammer lies in its long life. The Valve Unit will last for years without repair or replacement. The Cylinder Bore and Piston Rod are HARD CHROME PLATED, features which double the life of the Rammer and reduce maintenance costs at least one-half.

Have been adopted as standard by some of the largest users of Rammers throughout the Country. MADE IN FIVE SIZES. Send for Bulletin No. 300.

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TOOL CO., DAYTON, O.

The Same Consistent Performance Every Day

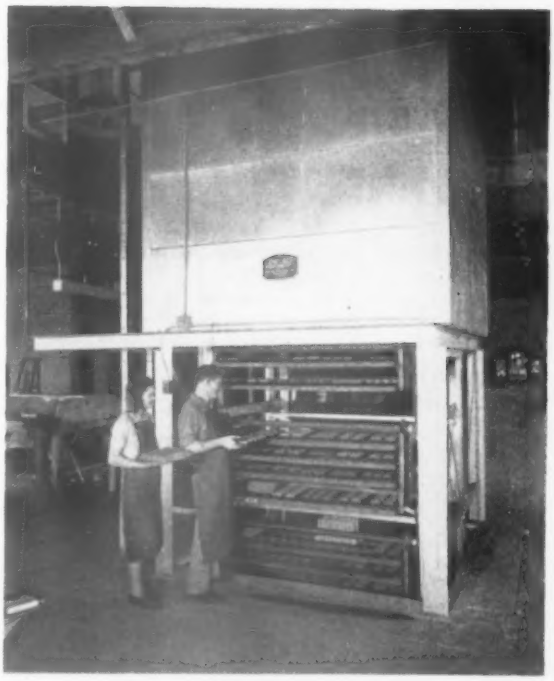
DRY-SYS OVENS for the FOUNDRY

Continuous & Batch Type Ovens for
CORE BAKING • MOLD DRYING • LADLE DRYING

TIME SAVING
FUEL SAVING
MONEY SAVING

- Properly baked cores at the right temperature
- Regular schedules of core production
- Uniform temperature throughout the oven
- Continuous automatic control
- Thorough ventilation and exhaust of fumes
- Expert engineering—Finest construction

DRY-SYS also manufactures systems for supplying Preheated Cupola Air, using gas or oil fired indirect Air Heaters, pressure type.



Dry-Sys Vertical Continuous Core Oven.

DRY-SYS Engineers welcome your inquiries—No obligation.

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for pattern shops

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Easy Operation

The motor itself forms the headstock, and any or all speeds, from 600 to 3600 r.p.m. are readily obtained by turning the convenient hand wheel. Patternmakers using this Lathe agree it is the most efficient and reliable Speed Lathe ever built. "Oliver" Lathes range in size from the Speed Lathe to large Pattern Lathes. Write for details.

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Grand Rapids 2, Michigan

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Cut your high labor costs of material handling 50%, by eliminating slow hand work with

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One hopper instead of several. Built for hot, cold, wet or dry materials. Carries safely on any standard fork or platform lift truck. Automatically dumps, rights and locks securely . . . QUICK, STURDY, SAFE & ECONOMICAL. Types and sizes for every job. Write today for detailed bulletin "In Dollars & Sense".

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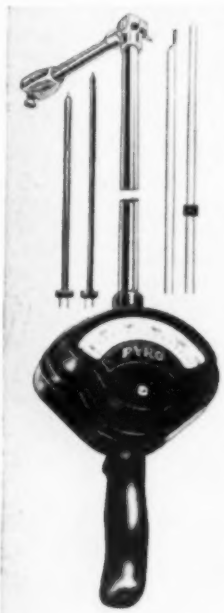
PYRO

YOU CANNOT AFFORD NOT TO OWN ONE!



This NEW PYRO IMMERSION PYROMETER represents the acme of ruggedness, accuracy and dependability and is INDISPENSABLE in any MODERN non-ferrous foundry. It assures you low cost production of UNIFORM and SOUND CASTINGS.

Constructed in a shock, moisture and dust-proofed shielded steel housing, it is immune to magnetic influences and will withstand the roughest handling. Used with instantly interchangeable "Protected Type" and "Bare Metal" thermocouples without adjustment or recalibration it is the ideal instrument for use in furnaces, crucibles or ladles. It has a large 4 inch direct reading scale and lock swivel—another NEW PYRO feature. Ranges 0-1500 and 0-2500°F.

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This simplified Optical Pyrometer takes the "wreck" out of "reckon." Many a heat has been wrecked as a result of "guessing" at the temperature. "PYRO" is a lightweight (3 lbs.), totally SELF-CONTAINED, DIRECT READING, STURDY unit made to stand rough use, but it is ABSOLUTELY ACCURATE and DEPENDABLE. No correction charts, no accessories, no upkeep! New concentrated test-mark and ease of operation permit unusually CLOSE and RAPID temperature determination even on MINUTE SPOTS, FAST MOVING OBJECTS or the SMALLEST STREAMS.

THE "SPECIAL FOUNDRY TYPE" AND "TRIPLE RANGE" HAVE, IN ADDITION TO THE STANDARD CALIBRATED RANGES, A RED CORRECTION SCALE DETERMINING THE TRUE SPOUT AND POURING TEMPERATURES OF MOLTEN IRON AND STEEL WHEN MEASURED IN THE OPEN.

PYRO is furnished in 5 ranges to meet all plant and laboratory requirements, it is standard equipment with the leading plants in YOUR industry—Ask for our catalog No. 80—it will interest you!

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New Plant & Laboratory: **BERGENFIELD 6, N. J.**

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PRODUCTION
of
GREY IRON CASTINGS

ONE OF THE NATION'S
LARGEST AND MOST MODERN
PRODUCTION FOUNDRIES

ESTABLISHED 1866
THE WHELAND COMPANY
FOUNDRY DIVISION

MAIN OFFICE AND MANUFACTURING PLANTS
CHATTANOOGA 2, TENNESSEE

BESSEMER FERRO-SILICONS
GLOBE IRON COMPANY
THE PIONEERS OF SILVERY IRON
SPECIAL HIGH SILICON GRADES
YOU CAN'T THINK OF SILVERY IRON
WITHOUT THINKING of GLOBE
GLOBE IRON CO JACKSON, O.

IT'S NEW—IT'S SENSATIONAL

AMASTEEL

GENUINE ALLOY STEEL

SHOT

LASTS MANY TIMES LONGER

Here at last is peak efficiency in Shot for blast CLEANING and PEENING. AMASTEEL SHOT is far better than ordinary hard iron abrasives because it is TRUE ALLOY STEEL.

Compared to regular blasting materials, AMASTEEL offers an amazing superiority due to its long life and resistance to breakdown and greater CLEANING and PEENING speed. This feature means additional savings on labor, handling, storage, freight costs, and dust disposal.

AMASTEEL is produced under exclusive patents and is available in sizes that meet all CLEANING and PEENING requirements.

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PRODUCERS OF
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CLEANBLAST
ALLOY 99

ALLOY METAL ABRASIVE CO.

311 WEST HURON ST. ANN ARBOR, MICH.

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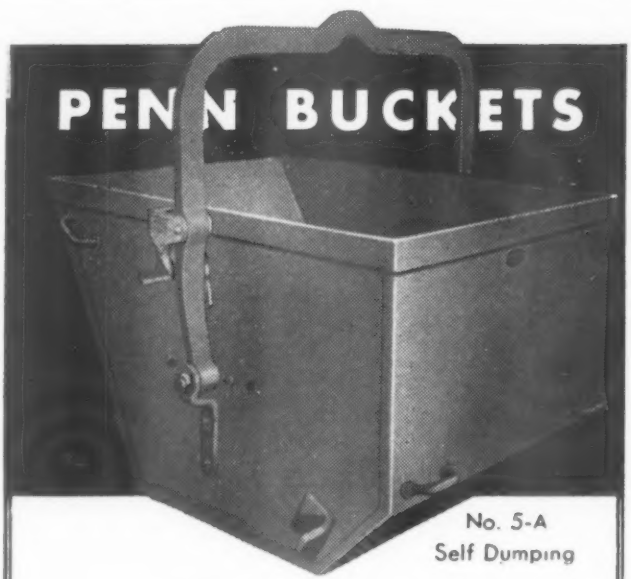

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Careful balancing makes Penn Buckets self dumping when loaded and self righting when empty. Welded construction prevents "clinging" makes them empty easily and completely.

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PENN IRON WORKS

READING, PENNA.

COLORS—Clear, Red, Black and Yellow — also Thinner.

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with CO-LOIDAL-AC Pattern Lacquer

- Dries fast
- Only one coat necessary
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- Long wearing; finish lasts indefinitely
- Saves molders' time; does not stick to sand
- Does not deteriorate in storage; pigments always in suspension

Available in gallons, five gallons and drums. Order direct from factory.

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Perkiomen Junction, Phoenixville, Pa.

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HOSE CLAMP

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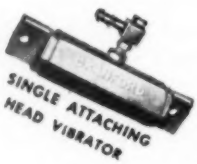
SINGLE ATTACHING HEAD VIBRATOR

1915 BRANFORD VIBRATORS USA

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RENEWABLE NOZZLE CLEANER & SPRAYER

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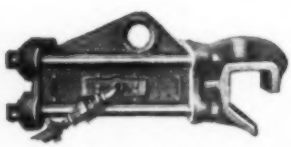
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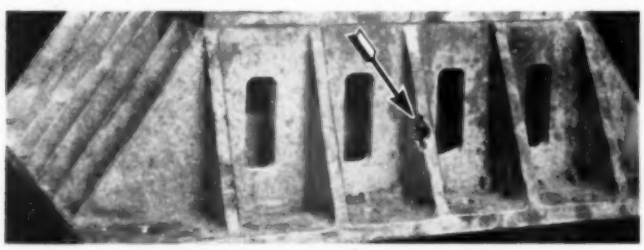
BLOW GUN 450

NEW HAVEN VIBRATOR CO.

128 CHESTNUT STREET, NEW HAVEN 7, CONN.



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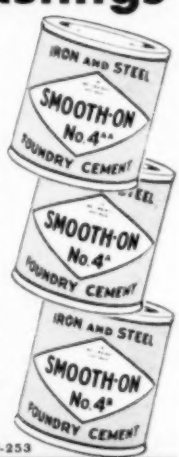
Better Looking Castings

Fill in pores, sand holes, blow holes, pock marks, dents, etc. with Smooth-On No. 4 Foundry Cement and these imperfections practically disappear. You match color and texture of the metal and can file the surface smooth. In leading foundries this treatment of surface-blemished but internally sound castings is as routine as removing unsightly "fins".

Three shades to choose from. For light gray castings and polished surfaces, Smooth-On No. 4AA. For medium gray, medium lustre castings, Smooth-On No. 4A. For dark, lower lustre castings, Smooth-On No. 4B. If your supply house hasn't Smooth-On No. 4, write us. If you've never used Smooth-On we'll send you generous working sample.



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Shows uses for Smooth-On Foundry Cement and many plant and home jobs done with other Smooth-On Iron Cements — leaks stopped, cracks sealed, loose parts tightened. Write for YOUR free copy.

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QUIKDRAW

FOR PERFECT CORES *In Less Time!*

Invented by Myron C. Kline

- No special setup or rigging necessary to produce uniform, true-to-size, handmade cores with a Quikdraw Core Machine. Lightens the coremaker's work, eliminates undersized, patched-up jobs. Small wonder why more than half our orders are repeaters from satisfied users. Write for further information.

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RANSOHOFF WET CLEANING MILLS

. . . with automatic star-return . . .

SAVE 30% to 70% ON YOUR CLEANING COSTS

AND GET
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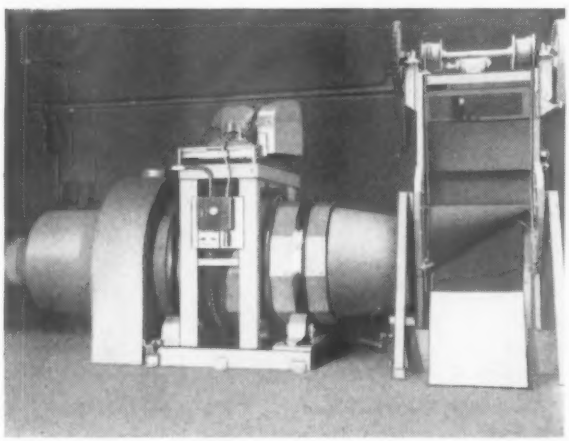
SUPERIOR ADVANTAGES,
TOO:

Illustrated:
60" x 72" End-loading, end-unloading mill cleaning hard iron malleable castings.



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Let RANSOHOFF ENGINEERS help solve your cleaning problems

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First in metal cleaning equipment

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Checks weights with dead accuracy! Convenient. Fits practically any setup. Low priced.

Photo shows use of the Dillon and chain hoist for tally on loads shipped by truck. The versatile Dillon has scores of uses in nearly every industry and service — for measuring tensile strength, torque, and power as well as dead weight. Nine capacities, 0-500 to 0-20,000 lbs., same size only 8¼" x 6¼" x 3". Weights less shackles, only 5 lbs., 10 oz.

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Made to meet quality standards, not price requirements

SHANKS—Forged and Ground—Reduce breakage.

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BEDCO ALLOY steel made to our own specifications.

Skilled hammermen—Precise heat treating

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Special tools made to blue print or sample

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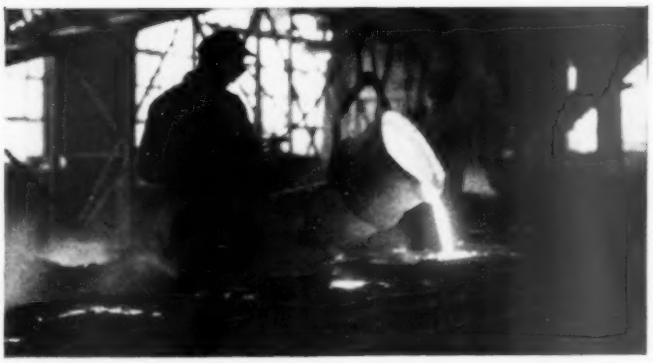
PROPER PLACING OF FLANGES

Assures Efficient Truscon Steel Flask Performance

The flanges and ribs of Truscon Steel Flasks are designed to help the molder, encouraging steadier production of better work. • The flange on the filling side of Truscon Steel Flasks is turned out to prevent interference with filling or shaking out. The flange on the bottom side or parting line is turned in, forming a sand strip to carry the sand. • There are many features like these built into the wide range of Truscon Steel Flasks — features of special importance in helping you develop better foundry practices. • Ask an experienced Truscon man to help you adapt Truscon Steel Flask advantages to your special needs. Write for illustrated catalog on Truscon Steel Flasks.



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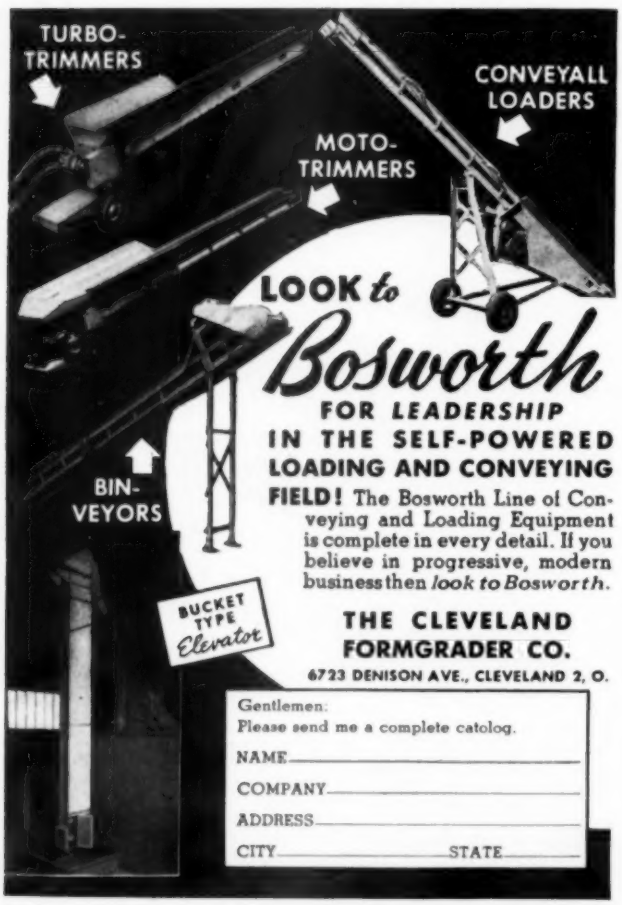

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FOR *LEADERSHIP* IN THE SELF-POWERED LOADING AND CONVEYING FIELD! The Bosworth Line of Conveying and Loading Equipment is complete in every detail. If you believe in progressive, modern business then *look to Bosworth*.

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HIGH CALCIUM FLUXING LIMESTONE

for use in
Gray Iron Cupolas
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Quarry and plant at Hillsville, Pa. and Lowellville, Ohio

THE CARBON LIMESTONE COMPANY

Established 1848

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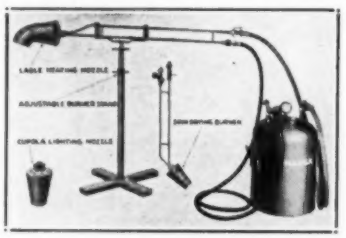
HAUCK ALL-PURPOSE BURNER OUTFIT



- Starts Cupola Fires
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No. 2-5-E Outfit, tank and interchangeable burner nozzle burns oil with air at 40 p.s.i. or more. Portable stand saves labor.

Instant Lighting. No Preheating. Adjustable Flame Size. Other Compressed Air and Hand Pump Burners. Free Catalog.

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DFC STATIONARY TYPE MELTING FURNACES

(Gas or Oil Fired)

Designed for melting any non-ferrous metal that melts under 2200° F. Built for all crucible sizes, from 40 through 125.

FEATURES:

- Heat is circulated top to bottom, bottom to top and circumferentially insuring even distribution of heat throughout crucible.
- Tangential firing.
- Heavy, substantial refractory lining which saves heat loss.
- Few wearing parts.

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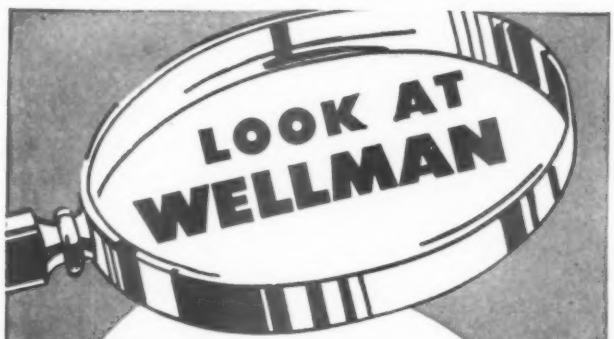

Wellman Bronze & Aluminum Co., Cleveland, invites you to inspect its pattern shop facilities. One of the country's most modern, well-equipped shops is available to handle any of a wide range of requirements for *wood or metal* patterns. Highly skilled personnel under thorough supervision.

Take a trip through our plant in person, or write the address below for further details.

MAGNESIUM, ALUMINUM
BRONZE CASTINGS

WELLMAN
BRONZE & ALUMINUM COMPANY
2502 EAST 93rd STREET · CLEVELAND, OHIO

in '16 # The Moline Hand Squeezer

enables you to put up more molds with greater ease than with any other machine

The Moline hand Squeezers are constructed as follows: namely: A substantial steel "H" beam 5 in. x 5 in., 8 feet long set in the ground 2½ feet bedded in concrete, forms the standard or base for this machine. Occupies only 5 in. x 5 in. of floor space.

¾ inch holes are drilled in the "H" beams to bolt molders bench and the brackets for swinging arm. There are also extra holes drilled in "H" beam to raise or lower the molders bench or bracket, thus adjusting the machine to suit the size and convenience of the operator.

The Squeezer plate attached to the swinging arm can be raised or lowered about 2 inches by loosening cap screw which holds the lever in place. After making this adjustment, you place the hand lever back in its regular position. The parts are machined by templates and are interchangeable.

We have had many of these machines in constant use in our foundry for over three years, and on careful inspection find that they show no signs of wear.

The arm swings either to the right or to the left on two 1 inch tool steel centers. Attached to the lower end of the bracket is a shoe with a set screw and jamb nut, which operates against the lower end of the center, and can be adjusted to take up any lost motion.

Working parts of this machine are all above the molders bench, well protected from dust.

We designed this machine for our own use, and it has been such a grand success that we concluded to manufacture them for the trade.

It is very simple, takes up practically no space whatever, is very durable and giving great results.

We have sold them to large foundries at Owen Sound, Canada, Cleveland, Ohio, St. Louis, Mo., Milwaukee, Wis., New Haven, Conn., Evansville, Ind., and Moline and Rock Island, Ill., and they have given satisfaction in each case.

The swinging arm, balanced on the steel centers, can be swung to the right or left by a slight motion of the hand, thus making it convenient for bench molding as well as squeezer work.

Any depth of flask can be used by dropping or raising Molder's bench. We are using Flasks 15 in. x 15 in. x 9 in. and 10 in. x 25 in. x 9 in. Our molders are turning out from twenty to forty more molds per day, with this machine, than any other standard machine, we have used or seen.

The weight of machine crated is about 400 pounds.

Write for full details and prices.

in '48 ## History Repeats Itself

The above is an exact copy of advertising literature used in 1916, and every word is just as true today as it was over 32 years ago.

Many Moline Molding Machines have been in constant use for one-third of a century and are still turning in top flight performance, the most efficient squeezers to be found.

SEVENTY YEARS OF SERVICE

MIW

MOLINE
IRON WORKS
MOLINE, ILLINOIS, U. S. A.

YOU SAW IT

AT THE SHOW —

The BUTLER CARSCOOP

GASOLINE OR ELECTRIC POWERED

THE WORLD'S FASTEST CAR UNLOADER!

Handles

Metal, scrap, ashes, bauxite, coal, coke, molding sand, cement, ingots and all similar materials and chemicals.

The response of those who saw the BUTLER CARSCOOP at the American Foundrymen's Association Convention was highly gratifying. And the flow of orders for the nimble, efficient, hardworking CARSCOOP is ample proof of its enthusiastic reception. We have many reports of the CARSCOOP'S cost-cutting ability . . . (a 40 ton car of molding sand unloaded in 37 minutes, — for example). Complete data and specifications will be sent gladly on request.

BUTLER BIN CO.
CARSCOOP DIVISION
WAUKESHA, WISCONSIN

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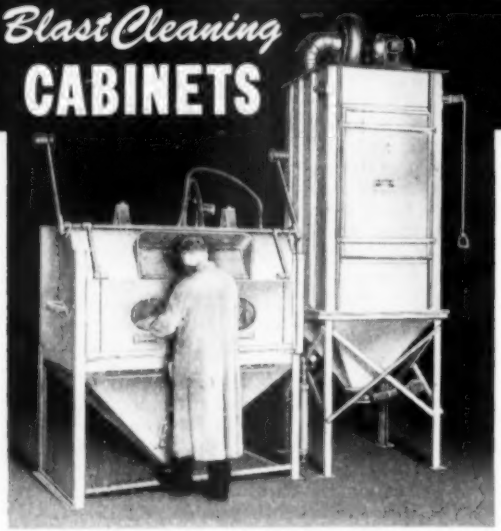
Blast Cleaning
CABINETS



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Manufacturers and Engineers SAND BLAST AND DUST COLLECTING EQUIPMENT, WELDING FUME COLLECTORS

A 5135-1/9A

Severance CARBIDE MIDGET MILLS

3/4 SIZE

Operate at grinding-wheel speeds
Outlast scores of mounted points
Cut 50 times faster
MANY SHAPES and SIZES
Cut hard materials - Rockwell 65-C

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PRODUCERS CORE SAND CORPORATION
PITS AT MICHIGAN CITY, INDIANA AND SAWYER, MICHIGAN
MICHIGAN CITY, INDIANA

BERKSHIRE JOLT SQUEEZE MOLDING MACHINES

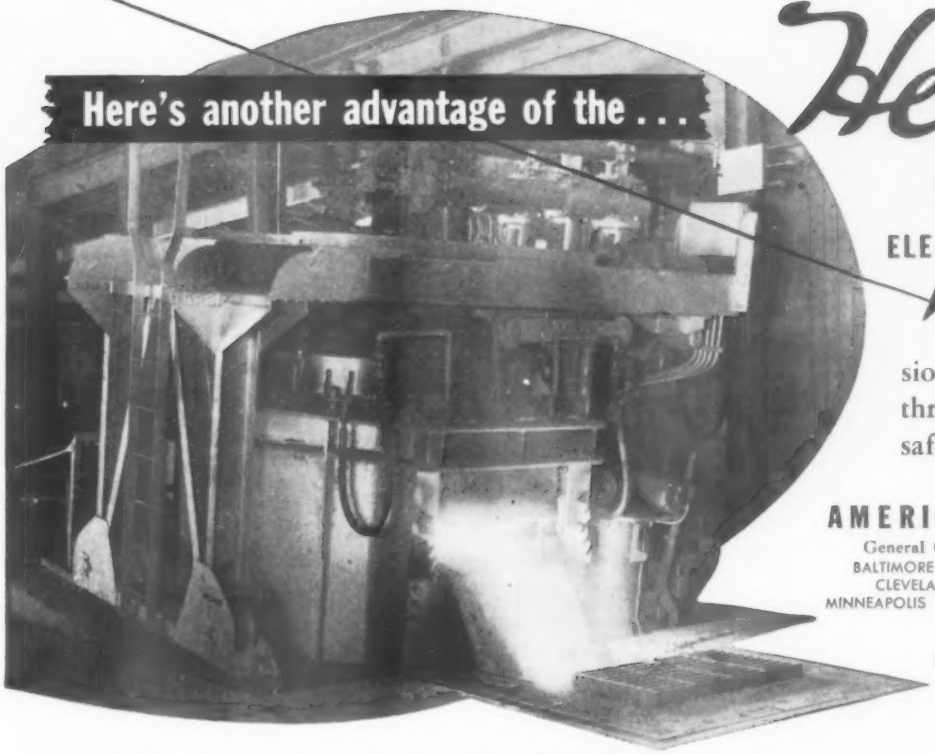
Model H Jolt Squeeze

CANNON AIR VIBRATORS

10" SQUEEZE CYLINDER

4" JOLT CYLINDER

CANNON VIBRATOR CO. • 1111 Power Ave. Cleveland, Ohio • **BERKSHIRE MFG. CO.**



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ELECTRIC MELTING FURNACE

Mechanisms are precision built, gear driven throughout, for maximum safety and dependability.

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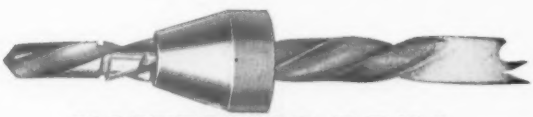

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SPECIAL TYPE *for* FOUNDRY SERVICE

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- Will not cause Nausea or "Salt Sickness"
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- Can be purchased in economical, sanitary factory sealed "EXPENDABLE" Dispensers or in bulk.

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UNITED STATES SAFETY SERVICE COMPANY
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HOW HIGH IS YOUR SANDPILE?
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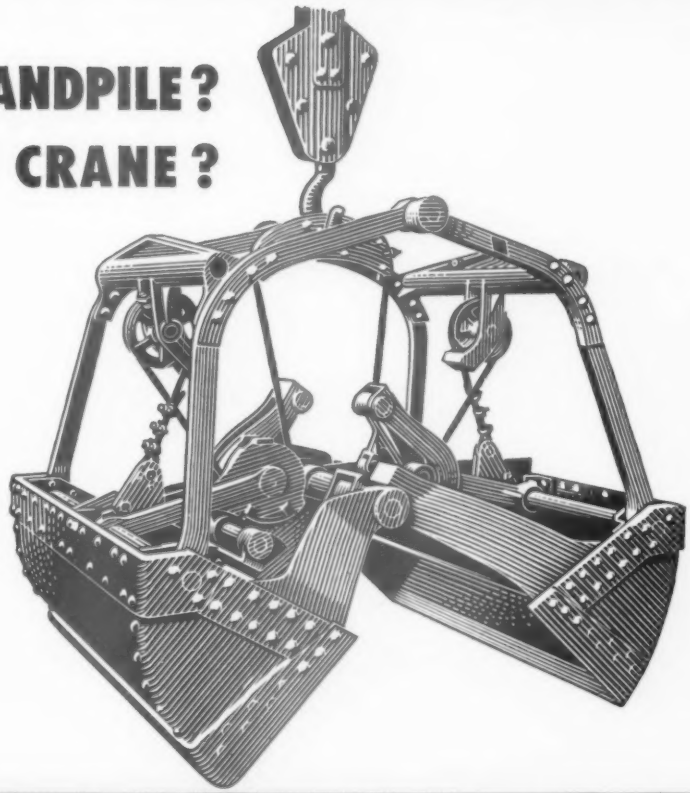

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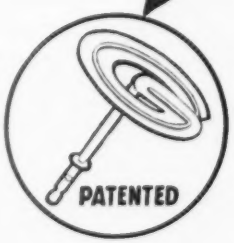

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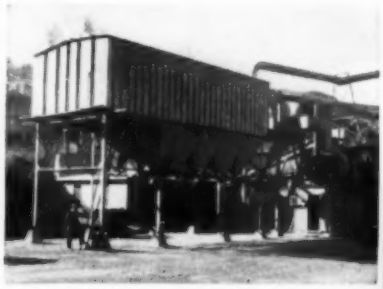

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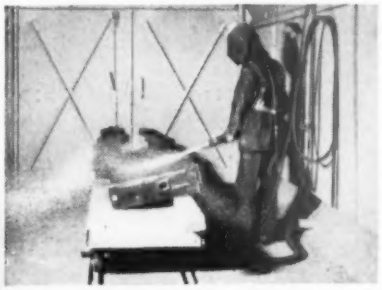

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DUST COLLECTOR (Shake-out)

Newcomb-Detroit Co., Inc., 5741 Russell St., Detroit 11, Mich.

DUST RECOVERY SYSTEMS

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Kirk & Blum Mfg. Co., Cincinnati 25, O.

DUST RECOVERY SYSTEMS (Cont'd.)

Parsons Engineering Corp., 2545 E. 79th St., Cleveland 4, O.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

DYES & CHEMICALS

Eaton Chemical & Dyestuff Co., 1490 Franklin, Detroit, Mich.

ELECTRIC FURNACES (see Furnaces, Electric)

ELECTRODES (Graphite and Amorphous)

International Graphite & Electrode Corp., St. Marys, Pa.
National Carbon Co., Inc., Electrode Sales Div., 30 E. 42nd St., New York 17, N. Y.

ELEVATORS

Standard Conveyor Co., North St. Paul 9, Minn.

ELEVATORS (Bucket)

Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Chain Belt Co., 1671 W. Bruce St., Milwaukee 4, Wis.
Jeffrey Mfg. Co., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chiago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.

ELEVATORS (Material Handling)

Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

ELEVATORS (Pneumatic, Material Handling)

Fuller Co., Catasauqua, Pa.

ENGINEERING SERVICE (Foundry)

Carman, Edwin S., Lee Rd. at Mayfield, Cleveland 18, O.
Frank D. Campbell, 332 So. Michigan Ave., Chicago, Ill.
Conover Engineering Co., 1740 East 12th St., Cleveland 14, Ohio.
Engineering Service Inc., 610 West Michigan St., Milwaukee 3, Wis.
Giffels & Vallet, Inc., Marquette Bldg., Detroit, Mich.
Lester B. Knight & Associates, Inc., 600 West Jackson Blvd., Chicago 3, Ill.
A. H. Putnam Co., 1319 2nd Ave., Rock Island, Ill.
Reichert, W. G., Engineering Co., 1060 Broad St., Newark, N. J.
Swan, Harry B., 2983 East Grand Blvd., Detroit, Mich.
Westover Engineers, 424 E. Wells St., Milwaukee 2, Wis.
Wickland Co., A. A., 205 W. Wacker Dr., Chicago 6, Ill.

ENGINEERING SERVICE (Permanent Mold)

Industrial Pattern Works, 2621 Belmont Ave., Chicago 18, Ill.
Master Pattern Co., 1315 Main Ave., Cleveland, Ohio.

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American Air Filter Co., Inc. Louisville 8, Ky.
American Wheelabrator & Equipment Co., Mishawaka, Ind.
Newcomb-Detroit Co., Inc., 5741 Russell St., Detroit 11, Mich.
Pangborn Corporation, Hagerstown, Md.
Parsons Engineering Corp., 2545 E. 79th St., Cleveland 4, O.
Propellair Inc., Springfield, O.
Schmeig Industries, 6560 Cass Ave., Detroit 2, Mich.

EXHAUST SYSTEMS (Cont'd.)

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Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.
Westinghouse Electric Corp., B. F. Sturtevant Div., 40 Wall St., New York 4, N. Y.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FABRICATORS (Metal)

Roura Iron Works, 1405 Woodland Ave., Detroit 11, Mich.

FACINGS

Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
National Carbon Co., Inc., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.
Stevens Inc., Frederic B., Detroit 16, Mich.
Superior Flake Graphite Co., 33 S. Clark St., Chicago 3, Ill.
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FANS

General Blower Co., Morton Grove, Ill.

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Joy Mfg. Co., La Del Division, New Philadelphia, Ohio.
Pangborn Corp., Hagerstown, Md.
Propellair Inc., Springfield, O.
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FEEDERS (Rotary)

Fuller Company, Catasauqua, Pa.
Link Belt Co., 300 W. Pershing Rd., Chcicago 9, Ill.
Newaygo Engineering Co., Newaygo, Mich.

FEEDERS (Sand)

Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

FERROBORON

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.
Molybdenum Corp. of America, Pittsburgh 19, Pa.

FERROCHROME

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.
Hickman-Williams & Co., Cleveland, O.
Ohio Ferro-Alloys Corp., Canton 2, O.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FERROCOLUMBIUM

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.

FERROMANGANESE

Bethlehem Steel Co., Bethlehem, Pa.
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.
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Climax Molybdenum Co., 500 Fifth Ave., New York 18, N. Y.
Molybdenum Corporation of America, Pittsburgh 19, Pa.

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Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.
Globe Iron Co., Jackson, Ohio.
Jackson Iron & Steel Co., Jackson, O.
Keokuk Electro Metals Co., 429 So. 4th St., Keokuk, Iowa.
Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.
Ohio Ferro-Alloys Corp., Canton 2, O.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

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Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

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Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.
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Ironton Fire Brick Co., Ironton, O.
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Stevens Inc., Frederic B., Detroit 16, Mich.

FIRE CLAY

Eastern Clay Products, Inc., Jackson, O.
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
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Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
Metal Blast, Inc., 871 E. 67th St., Cleveland, Ohio.
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Lanly Co., 750 Prospect Ave., Cleveland 15, Ohio.
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Newcomb-Detroit Co., Inc., 5741 Russell St., Detroit 11, Mich.

HEATERS (Space, Unit, Oven, Water)

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Westinghouse Electric Corp., B. F. Sturtevant Div., 40 Wall St., New York 4, N. Y.

HELMETS (Blasting)

American Wheelabrator & Equipment Co., Mishawaka, Ind.
American Optical Co., Southbridge, Mass.
Mine Safety Appliance Co., Braddock, Thomas & Meade Sts., Pittsburgh 8, Pa.
Pangborn Corp., Hagerstown, Md.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, O.

HELMETS (Welding)

American Optical Co., Southbridge, Mass.

HOISTS (Air)

Chicago Pneumatic Tool Co., 8 East 44th St., New York 17.
Curtis Pneumatic Machinery Co., 1922 Kienlen Ave., St. Louis 20, Mo.
Gardner-Denver Co., Quincy, Ill.
Independent Pneumatic Tool Co., Aurora, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Joy Mfg. Co., Sullivan Division, Michigan City, Ind.

HOISTS (Chain)

Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Reading Chain & Block Corp., 2108 Adams St., Reading, Pa.

HOISTS (Electric)

Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Conco Engineering Works, Mendota, Illinois.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Joy Mfg. Co., Sullivan Division, Michigan City, Ind.
Modern Equipment Co., Port Washington, Wis.
Reading Chain & Block Corp., 2108 Adams St., Reading, Pa.
Robbins & Myers, Inc., Springfield, Ohio.
Shepard-Niles Crane & Hoist Corp., Montour Falls, N. Y.

HOISTS (Electric) (Cont'd.)

Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

HOISTS (Hand)

Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.

HOSE (Air, Blasting, Water, Gas)

Gardner-Denver Co., Quincy, Ill.
Independent Pneumatic Tool Co., Aurora, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Pangborn Corp., Hagerstown, Md.
Raybestos-Manhattan, Inc., Manhattan Rubber Div., Passaic, N. J.
Schramm Inc., West Chester, Pa.

HYDRAULIC CLEANING EQUIPMENT

Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Ill.
Pangborn Corp., Hagerstown, Md.
N. Ransohoff Inc., 208 W. 71st St., Cincinnati 16, O.

ILLUMINATORS (X-Ray Film)

Eastman Kodak Co., Rochester, N. Y.
General Electric X-Ray Corp., 4855 West McGeoch Ave., Milwaukee 14, Wis.

IMPREGNATING SYSTEMS

Empire Varnish Co., 2636 E. 76th St., Cleveland 4, O.

INDUSTRIAL ENGINEERING SERVICE

Lester B. Knight & Associates, Inc., 600 West Jackson Blvd., Chicago 3, Ill.
Reichert Engineering Co., W. G., 1060 Broad St., Newark, New Jersey.

INGOT MOLDS

Acme Foundry Co., Detroit 16, Mich.

INGOTS (Magnesium)

Christiansen Corp., 1515 No. Kilpatrick, Chicago 51, Ill.

INGOTS (Nonferrous)

Ajax Metal Co., Philadelphia 23, Pa.
American Smelting & Refining Co., 120 Broadway, New York 5.
Apex Smelting Co., 2534 Fillmore St., Chicago 12, Ill.
Christiansen Corp., 1515 No. Kilpatrick, Chicago 51, Ill.
Cleveland Electro Metals Co., W. 38th St. & NP RR. Cleveland 13, O.
Federated Metals Div., American Smelting & Ref. Co., New York 5.
International Nickel Co., Inc., 67 Wall St., New York City 5.
R. Lavin & Sons Inc., 3426 So. Kedzie Ave., Chicago 23, Ill.
Niagara Falls Smelting & Refining Corp., 2204 Elmwood Ave., Buffalo 17, N. Y.
Rossborough Supply Co., 1456 W. 9th St., Cleveland 13, O.
Silverstein & Pinsof, Inc., 1720 N. Elston, Chicago 22, Ill.
Sonken-Galamba Corp., Kansas City 18, Kansas.
U. S. Reduction Co., East Chicago, Ind.

INJECTION MOLDING MACHINES

Lester-Phoenix Inc., 2711 Church St., Cleveland 13, Ohio.

INOCULANTS

Carborundum Co., Perth Amboy, N. J.

INSULATORS (for Castings heads)

E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

IRON CEMENT

Smooth-On Mfg. Co., 570 Communipaw Ave., Jersey City 4, N. J.

IRON ORE

Bethlehem Steel Co., Bethlehem, Pa.
Pickands, Mather & Co., Cleveland 14, O.

IRON OXIDES

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Delta Oil Products Co., Milwaukee 9, Wis.

JACKETS (Mold)

Adams Co., Dubuque, Iowa.
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Diamond Clamp & Flask Co., Richmond, Ind.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.
United Pattern Works, 12115 Woodline, Detroit 28, Mich.

LABORATORY EQUIPMENT (Chemical)

Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
General Electric X-Ray Corp., 4855 West McGeoch Ave., Milwaukee 14, Wis.

LABORATORY EQUIPMENT (Physical)

W. C. Dillon & Co. Inc., 5410 W. Harrison St., Chicago 44, Ill.
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
General Electric X-Ray Corp., 4855 West McGeoch Ave., Milwaukee 14, Wis.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Norton Co., Worcester 6, Mass.

LADLES

Bethlehem Steel Co., Bethlehem, Pa.
Haynes Foundry Equipment Co., 814 Ada St., Kalamazoo 21, Mich.
Industrial Equipment Co., Minster, O.
Modern Equipment Co., Port Washington, Wis.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

LADLE HEATERS

Whiting Corp. 15607 Lathrop Ave., Harvey, Ill.

LADLE LININGS

Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Ironton Fire Brick Co., Ironton, Ohio.

LATHE CENTERS

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

LEAD

American Smelting & Refining Co., 120 Broadway, New York 5.

LIMESTONE

Carbon Limestone Co., Youngstown, Ohio.

LINSEED OIL

Hercules Powder Co., Wilmington 99, Del.

LOADERS

Clearfield Machine Co., Clearfield, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

LUBRICANTS (Industrial)

Acheson Colloids Corp., Port Huron, Mich.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
Swan-Finch Oil Corp., R. C. A. Bldg., West, New York 26, N. Y.
United States Graphite Co., Saginaw, Mich.

LUMBER (All kinds)

Dougherty Lumber Co., 4300 East 68th St., Cleveland 5, O.

MACHINE KEYS

Standard Horse Nail Corp., New Brighton, Pa.

MACHINERY MOUNTING PADS

Fabreeka Products, Inc., 222B Summer St., Boston, Mass.

MAGNESIUM (Ingots)

Apex Smelting Co., 2534 Filmore St., Chicago 12, Ill.

MAGNET CONTROLLERS

Ohio Electric Mfg. Co., 5906 Maurice Ave., Cleveland, Ohio.

MAGNETS

Dings Magnetic Separator Co., 4740 W. McGeough, Milwaukee 7, Wis.
Ohio Electric Mfg. Co., 5906 Maurice Ave., Cleveland, Ohio.
Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.

MANGANESE (Briquets)

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.

MARKER (Castings)

Markal Co., 607 No. Western Ave., Chicago 12, Ill.

MATCHPLATES

Acme Aluminum Alloys Inc., 232 North Findlay St., Dayton 3, Ohio.
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
City Pattern Foundry & Machine Co., 1161 Harper Ave., Detroit 11, Mich.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Industrial Pattern Works, 2621 Belmont Ave., Chicago 18, Ill.
Master Pattern Co., 1315 Main Ave., Cleveland, Ohio.
Plaster Process Castings Co., 6922 Carnegie Ave., Cleveland 3, O.
Pressure Cast Products Co., 1028 Vermont Ave., Detroit 16, Mich.
Scientific Cast Products Corp., 1388-92 E. 40th St., Cleveland 3, O.

MATERIALS HANDLING

Hughes-Keenan Co., Mansfield, Ohio.

MATERIALS HANDLING DESIGN

Frank D. Campbell,
332 So. Michigan Ave.,
Chicago, Ill.

MATERIALS HANDLING (Hoists)

Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp.,
Tonawanda, N. Y.

MECHANICAL ENGINEERS

Frank D. Campbell,
332 So. Michigan Ave.,
Chicago, Ill.
Engineering Service Inc.,
610 West Michigan St.,
Milwaukee 3, Wis.
Giffels & Vallet, Inc.,
Marquette Bldg., Detroit, Mich.
Lester B. Knight & Associates, Inc.,
600 West Jackson Blvd.,
Chicago 3, Ill.
Reichert Engineering Co., W. G.,
1060 Broad St.,
Newark, New Jersey.

MELTING POTS

Acme Foundry Co., Detroit 16, Mich.

METAL CASTING PLASTER

United States Gypsum Co.,
300 W. Adams St., Chicago, Ill.

METAL CLEANING EQUIPMENT

American Wheelabrator & Equipment Co., Mishawaka, Ind.
N. Ransohoff, Inc., 208 W. 71st St.,
Cincinnati 16, O.

METALLOGRAPHIC EQUIPMENT

Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
General Electric X-Ray Corp.,
4855 West McGeoch Ave.,
Milwaukee 14, Wis.

METALLURGISTS

Crobaugh Co., Frank L.,
Blackstone Bldg., Cleveland, Ohio.

METERS (Gas, Air, Water)

Illinois Testing Laboratories, Inc.,
420 N. LaSalle St.,
Chicago 10, Ill.
Roots-Connersville Blower Corp.,
Connersville, Ind.

MIXERS (Core Wash)

Federal Foundry Supply Co.,
4600 E. 71st St., Cleveland 5, O.

MIXERS (Sand and Clay)

American Wheelabrator & Equipment Co., 505 S. Byrkit St.,
Mishawaka, Ind.
Beardsley & Piper Co., The, 2421 No. Cicero, Chicago 39, Ill.
Blystone Division, Standard Sand & Machine Co., 549 W. Washington St., Chicago 6, Ill.
Clearfield Machine Co.,
Clearfield, Pa.
Construction Machinery Co.,
Waterloo, Iowa.
Freeman Supply Co., 1152 Broadway, Toledo 5, O.
Jeffrey Mfg. Co., 907 N. Fourth St.,
Columbus 16, O.
Lancaster Iron Works,
Lancaster, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Royer Foundry & Machine Co.,
Kingston, Pa.

MODELS (Wood)

Master Pattern Co.,
1315 Main Ave., Cleveland, Ohio.

MOLD CONVEYORS

Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Co., The, 2421 No. Cicero, Chicago 39, Ill.
Chain Belt Co.,
1671 W. Bruce St.,
Milwaukee 4, Wis.

MOLD CONVEYORS (Cont'd.)

Cleveland Tramrail Div. of Cleveland Crane & Engineering Co.,
Wickliffe, Ohio.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd.,
Chicago 9, Ill.
Logan Co., 580 Cabel,
Louisville, Ky.
Mathews Conveyer Co.,
Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co.,
Newaygo, Mich.

MOLD DRYERS

Carl-Mayer Corp., 3030 Euclid Ave.,
Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Drying Systems, Inc., 1801 Foster Ave., Chicago 40, Ill.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, O.

MOLD OVENS and DRYERS

Carl-Mayer Corp., 3030 Euclid Ave.,
Cleveland 15, Ohio.
Despatch Oven Co.,
Minneapolis 14, Minn.
Drying Systems, Inc., 1801 Foster Ave., Chicago 40, Ill.
Foundry Equipment Co.,
1831 Columbus Rd.,
Cleveland 13, O.
Lanly Company, 750 Prospect Ave.,
Cleveland 15, O.
Newcomb-Detroit Co., Inc.,
5741 Russell St., Detroit 11, Mich.
Young Bros. Co., 6508 Mack Ave.,
Detroit 7, Mich.

MOLD TRUCKS (Power Operated)

Clark Tructractor Div. of Clark Equipment Co., Battle Creek, Mich.

MOLDING MACHINES

Adams Co., Dubuque, Iowa.
Arcade Manufacturing Div.,
Rockwell Mfg. Co.,
Freeport, Ill.
Beardsley & Piper Co., The,
2424 N. Cicero, Chicago 39, Ill.
Berkshire Mfg. Co., 1111 Power Ave., Cleveland 14, O.
Champion Foundry & Machine Co.,
1314 W. 21st St., Chicago 8, Ill.
Davenport Machine & Foundry Co.,
Davenport, Iowa.
Haynes Foundry Equipment Co.,
814 Ada St., Kalamazoo 21, Mich.
Herman Pneumatic Machine Co.,
Union Bank Bldg.,
Pittsburgh 22, Pa.
International Molding Machine Co.,
2608 W. 16th St., Chicago 8, Ill.
Johnston & Jennings Co.,
867 Addison Rd., Cleveland 14, O.
Milwaukee Foundry Equipment Co.,
3238 W. Pierce St.,
Milwaukee 4, Wis.
Moline Iron Works, Moline, Ill.
Nichols, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Pioneer Mfg. Co., West Allis, Wis.
S. P. O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.
Tabor Mfg. Co., 6225 Tacony St.,
Philadelphia 35, Pa.

MOLDING MACHINES (Jolt)

Adams Co., Dubuque, Iowa.
Champion Foundry & Machine Co.,
1314 W. 21st St., Chicago 8, Ill.
Davenport Machine & Foundry Co.,
Davenport, Iowa.
Haynes Foundry Equipment Co.,
814 Ada St., Kalamazoo 21, Mich.
Herman Pneumatic Machine Co.,
Union Bank Bldg.,
Pittsburgh 22, Pa.
International Molding Machine Co.,
2608 W. 16th St., Chicago 8, Ill.
Johnston & Jennings Co.,
867 Addison Rd., Cleveland 14, O.
Milwaukee Foundry Equipment Co.,
3238 W. Pierce St.,
Milwaukee 4, Wis.
Nicholls, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
S. P. O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.

MOLDING MACHINE MOUNTING PADS

Fabreeka Products, Inc.
222B Summer St., Boston, Mass.

MOLDING MACHINES (Rollover)

Champion Foundry & Machine Co.,
1314 W. 21st St., Chicago 8, Ill.
Davenport Machine & Foundry Co.,
Davenport, Iowa.
Herman Pneumatic Machine Co.,
Union Bank Bldg.,
Pittsburgh 22, Pa.
International Molding Machine Co.,
2608 W. 16th St., Chicago 8, Ill.
Johnston & Jennings Co.,
867 Addison Rd., Cleveland 14, O.
Milwaukee Foundry Equipment Co.,
3238 W. Pierce St.,
Milwaukee 4, Wis.
Nicholls, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
S. P. O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.

MOLDING MACHINES (Squeeze)

Acme Aluminum Alloys Inc.,
232 North Findlay St.,
Dayton 3, Ohio.
Adams Co., Dubuque, Iowa.
Champion Foundry & Machine Co.,
1314 W. 21st St., Chicago 8, Ill.
Davenport Machine & Foundry Co.,
Davenport, Iowa.
Haynes Foundry Equipment Co.,
814 Ada St., Kalamazoo 21, Mich.
Herman Pneumatic Machine Co.,
Union Bank Bldg.,
Pittsburgh 22, Pa.
International Molding Machine Co.,
2608 W. 16th St., Chicago 8, Ill.
Johnston & Jennings Co.,
867 Addison Rd., Cleveland 14, O.
Milwaukee Foundry Equipment Co.,
3238 W. Pierce St.,
Milwaukee 4, Wis.
Moline Iron Works, Moline, Ill.
Nicholls, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
S. P. O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.

MOLDING SANDS

Foundries Materials Co.,
Coldwater, Mich.
Industrial Silica Corp.,
Stambaugh Bldg., Youngstown, O.
Standard Silica Corp., 209 So.
LaSalle St., Chicago 4, Ill.
Wedron Silica Co., 38 So. Dearborn St., Chicago, Ill.

MOLD WASH

Federal Foundry Supply Co.,
4600 E. 71st St., Cleveland 5, O.
National Carbon Co., Inc., Carbon Products Div., 30 E. 42nd St.,
New York 17, N. Y.
United States Graphite Co.,
Saginaw, Mich.

MOLYBDENUM

Molybdenum Corporation of America, Pittsburgh 19, Pa.

MONORAIL SYSTEMS

American Monorail Co.,
13104 Athens Ave.,
Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co.,
1155 East 283rd St., Wickliffe, O.
Link Belt Co., 300 W. Pershing Rd.,
Chicago 9, Ill.
Modern Equipment Co.,
Port Washington, Wis.

MOTOR CONTROL

Westinghouse Electric Corp.,
Pittsburgh 30, Pa.

MOTORS (Electric)

Allis-Chalmers Mfg. Co.,
Milwaukee 1, Wis.
Westinghouse Electric Corp.,
Pittsburgh 30, Pa.

MOUNTING PADS, MOLDING AND SHAKEOUT MACHINES

Fabreeka Products, Inc.,
22B Summer St., Boston, Mass.

NAILS (Chill)

Angell Nail & Chaplet Co.,
4580 E. 71st St., Cleveland, Ohio.
Bethlehem Steel Co., Bethlehem, Pa.
Standard Horse Nail Corp.,
New Brighton, Pa.

NICKEL

International Nickel Co., Inc.,
67 Wall St., New York City 5.

NOZZLES (Blasting)

Alloy Metal Abrasives Co., 311 W. Huron St., Ann Arbor, Mich.
American Wheelabrator & Equipment Co., 505 S. Byrkit St.,
Mishawaka, Ind.
Davenport Machine & Foundry Co.,
Davenport, Iowa.
Federal Foundry Supply Co.,
4600 E. 71st St., Cleveland 5, O.
Norton Co., Worcester 6, Mass.
Pangborn Corp., Hagerstown, Md.
George Pfaff Inc., 11-61 Jackson Ave., Long Island City, N. Y.
W. W. Sly Mfg. Co.,
4753 Train Ave., Cleveland 2, O.

OIL BURNERS

Fisher Furnace Co., 2453 West Hubbard St., Chicago 12, Ill.
Hauck Manufacturing Co.,
106 Tenth St., Brooklyn 15, N. Y.
North American Mfg. Co.,
4455 E. 71st St., Cleveland 4, O.
Spin-O-Trol Co., 16 Perry St.,
Buffalo 3, N. Y.
Stroman Furnace & Engineering Co., Div. of Peterson Oven Co.,
9900 Franklin Ave.,
Franklin Park, Ill.

OVENS (Annealing and Heat Treating)

Carl-Mayer Corp., 3030 Euclid Ave.,
Cleveland 15, Ohio.
Despatch Oven Co.,
Minneapolis 14, Minn.
Electric Furnace Co., Salem, Ohio.
Foundry Equipment Co.,
1831 Columbus Rd.,
Cleveland 13, O.
Lanly Company, 750 Prospect Ave.,
Cleveland 15, O.
Lindberg Engineering Co.,
2450 West Hubbard,
Chicago 12, Ill.
Ross Engineering Corp., J. O., 350 Madison Ave., New York 17, N.Y.
Whiting Corp.,
15607 Lathrop Ave., Harvey, Ill.
Young Brothers Co., 6508 Mack Ave., Detroit 7, Mich.

OVENS (Core) (See CORE OVENS)

OVENS (Enameling, Japanning)

Carl-Mayer Corp., 3030 Euclid Ave.,
Cleveland 15, Ohio.
Despatch Oven Co.,
Minneapolis 14, Minn.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Lanly Co., 750 Prospect Ave.,
Cleveland 15, Ohio.
Newcomb-Detroit Co., Inc.,
5741 Russell St., Detroit 11, Mich.
Young Brothers Co., 6508 Mack Ave., Detroit 7, Mich.

OVENS (Mold)

Carl-Mayer Corp., 3030 Euclid Ave.,
Cleveland 15, Ohio.
Despatch Oven Co.,
Minneapolis 14, Minn.
Drying Systems, Inc., 1801 Foster Ave., Chicago 40, Ill.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Lanly Co., 750 Prospect Ave.,
Cleveland 15, Ohio.

OXYGEN

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.
Linde Air Products Co.,
30 E. 42nd St.,
New York 17, N. Y.

PARTING COMPOUNDS

Buckeye Products Co.,
7022 Vine St., Cincinnati 16, Ohio.
Delta Oil Products Co.,
Milwaukee 9, Wis.
Federal Foundry Supply Co.,
4600 E. 71st St., Cleveland 5, O.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Smith Facing & Supply Co.,
1857 Carter Rd., Cleveland 13, O.
Smith Oil & Refining Co.,
1102 Kilburn Ave., Rockford, Ill.

PARTING COMPOUNDS (Cont'd.)

Frederic B. Stevens, Inc., Detroit 16, Mich.
Superior Flake Graphite Co., 33 S. Clark St., Chicago 3, Ill.
Tamms Silica Co., 228 N. LaSalle St., Chicago 1, Ill.

PATTERN COATINGS

American Lacquer Solvents Co., Phoenixville, Pa.

PATTERN COMPOUND

Tamms Silica Co., 228 N. LaSalle St., Chicago 1, Ill.

PATTERN LETTERS

Freeman Supply Co., Toledo 5, O.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.

PATTERN LUMBER

Dougherty Lumber Co., Cleveland 5, O.
Freeman Supply Co., Toledo 5, O.

PATTERN PLASTER

United States Gypsum Co. 300 W. Adams St., Chicago, Ill.

PATTERN PLATES

Acme Aluminum Alloys Inc., 232 North Findlay St., Dayton 3, Ohio.
Buffalo Pattern Works, 830 Hertel Ave., Buffalo, N. Y.
City Pattern Foundry & Machine Co., 1161 Harper Ave., Detroit 11, Mich.
Freeman Supply Co., Toledo 5, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Industrial Pattern Works, 2621 Belmont Ave., Chicago 18, Ill.
Plaster Process Castings Co., 6922 Carnegie Ave., Cleveland 3.
Scientific Cast Products Corp., 1388-92 E. 40th St., Cleveland 3, O.

PATTERN PLATE STOCK

Freeman Supply Co., 1152 Broadway, Toledo 5, O.
Wellman Products Co., 1444 E. 49th St., Cleveland 3, Ohio.

PATTERN SHOP EQUIPMENT

Do All Company, Des Plaines, Ill.
Freeman Supply Co., 1152 East Broadway, Toledo 5, Ohio.
Oliver Machinery Company, Grand Rapids 2, Mich.
Parks Woodworking Machine Co., 1546 Knowlton St., Cincinnati 23, Ohio.
Skilsaw, Inc., 5000 N. Elston, Chicago 30, Ill.
Strand, N. A., Co., 5001 Wolcott Ave., Chicago 10, Ill.

PATTERN SUPPLY HOUSES

Freeman Supply Co., 1152 East Broadway, Toledo 5, Ohio.

PATTERNS

Industrial Pattern Works, 2621 Belmont Ave., Chicago 18, Ill.
Pressure Cast Products Co., 1028 Vermont Ave., Detroit 16, Mich.

PATTERNS (Wood, Metal)

Acme Aluminum Alloys Inc., 232 North Findlay St., Dayton 3, Ohio.
Buffalo Pattern Works, 830 Hertel Ave., Buffalo, N. Y.
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
City Pattern Foundry & Machine Co., 1161 Harper Ave., Detroit 11, Mich.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Industrial Pattern Works, 2621 Belmont Ave., Chicago 18, Ill.

PATTERNS (Wood, Metal) (Cont'd.)

Master Pattern Co., 1315 Main Ave., Cleveland, Ohio.
Pressure Cast Products Co., 1028 Vermont Ave., Detroit 16, Mich.
S. P. O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.
Wellman Bronze & Aluminum Co., 2525 E. 93rd St., Cleveland 4, O.

PERMANENT MOLD COATINGS

Acheson Colloids Corp., Port Huron, Mich.

PERMANENT MOLDS

Aimes Co., Inc., 2424 Euclid Ave., Cleveland, Ohio.
Master Pattern Co., 1315 Main Ave., Cleveland, Ohio.
Rossborough Supply Co., 1456 W. 9th St., Cleveland 13, O.

PHOTOGRAPHIC EQUIPMENT

Eastman Kodak Co., Rochester, N. Y.
General Eelectric X-Ray Corp., 4855 West McGeoch Ave., Milwaukee 14, Wis.

PHOTOGRAPHY (Industrial)

Eastman Kodak Co., Rochester, N. Y.

PIG IRON

Globe Iron Co., Jackson, O.
Jackson Iron & Steel Co., Jackson, Ohio.
Keokuk Electro Metals Co., 429 So. 4th St., Keokuk, Iowa.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.
Pickands, Mather & Co., Cleveland 14, O.
Woodward Iron Co., Woodward, Ala.

PIG IRON (Silvery)

Globe Iron Co., Jackson, O.
Jackson Iron & Steel Co., Jackson, O.
Keokuk Electro Metals Co., 429 So. 4th St., Keokuk, Iowa.
Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.

PINS (Flask)

Diamond Clamp & Flask Co., Richmond, Ind.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Truscon Steel Co., Pressed Steel Div., 6100 Truscon Ave., Cleveland, Ohio.

PISTON RINGS (for Molding Machines, Compressors, etc.)

Nicholls, Wm., H., Co., Richmond Hill, Long Island 18, N. Y.

PLANT ENGINEERING SERVICE

Conover Engineering Co., 1740 East 12th St., Cleveland 14, Ohio.
Giffels & Vallet, Inc., Marquette Bldg., Detroit, Mich.
Lester B. Knight & Associates, Inc., 600 West Jackson Blvd., Chicago 3, Ill.
Reichert Engineering Co., W. G., 1060 Broad St., Newark, New Jersey.

PLASTER OF PARIS

United States Gypsum Co., 300 W. Adams St., Chicago, Ill.

PLATES (Bottom)

Adams Co., Dubuque, Iowa.
Christiansen Corp., 1515 No. Kilpatrick, Chicago 51, Ill.

PLATES (Bottom) (Cont'd.)

Diamond Clamp & Flask Co., Richmond, Ind.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

PLATES (Core Drying)

Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Christiansen Corp., 1515 No. Kilpatrick, Chicago 51, Ill.
Diamond Clamp & Flask Co., Richmond, Ind.
Johns-Manville, 22 East 40th St., New York City 16.

PLATING TEMPERATURE CONTROLS

Foxboro Company, Foxboro, Mass.

PLUMBAGO

Bloomsbury Graphite Co., Bloomsbury, N. J.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Frederic B. Stevens, Inc., Detroit 16, Mich.
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Gray Iron Foundres Society Inc., 1010 Public Square Bldg., Cleveland 13, Ohio.

TRAMRAIL SYSTEMS

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Modern Equipment Co., Port Washington, Wis.

TROLLEYS

Curtis Pneumatic Machinery Co., 1922 Kienlen Ave., St. Louis 20, Mo.
Modern Equipment Co., Port Washington, Wis.

TRUCK BATTERIES (Industrial)

Electric Storage Battery Co., Allegheny Ave. at 19th St., Philadelphia 3, Pa.

TRUCK CRANES

Elwell-Parker Electric Co., 4223 St. Clair Ave., Cleveland 14, O.
Hughes-Keenan Co., Mansfield, Ohio.
Silent Hoist & Crane Co., 885 63rd St., Brooklyn 20, N. Y.

TRUCK WHEELS

Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

TRUCKS (Core Oven)

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

TRUCKS (Electric Industrial)

Elwell-Parker Electric Co., 4223 St. Clair Ave., Cleveland 14, O.

TRUCKS (Power Lift)

Clark Tructractor Div. of Clark Equipment Co., Battle Creek, Mich.
Elwell-Parker Electric Co., 4223 St. Clair Ave., Cleveland 14, O.

TUBES (Annealing)

Pressed Steel Co., Wilkes-Barre, Pa.

TUBES (X-Ray)

General Electric X-Ray Corp., 4855 West McGeoch Ave., Milwaukee 14, Wis.

TUMBLING BARRELS

Cleveland Chaplet & Mfg. Co., 1197 West 67th St., Cleveland 2, O.
Haynes Foundry Equipment Co., 814 Ada St., Kalamazoo 21, Mich.
N. Ransohoff Inc., 208 W. 71st St., Cincinnati 16, O.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

TURNTABLES

Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Modern Equipment Co., Port Washington, Wis.
Newaygo Engineering Co., Newaygo, Mich.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

UNIT HEATERS

Dravo Corp., Neville Island, Pittsburgh 25, Pa.

UNLOADERS (Portable-Gas Electric)

Cleveland Formgrader Co., 6723 Denison Ave., Cleveland, Ohio.

VALVES (Air, Water, Steam)

Air-Way Pump & Equipment Co., 1050 N. Kilbourn, Chicago, Ill.
Cleveland Vibrator Co., 2828 Clinton Ave., W., Cleveland 13, Ohio.
Dallett Co., 165 West Clearfield, Philadelphia, Pa.
North American Mfg. Co., 4455 E. 71st St., Cleveland 4, O.

VALVES (Adjustable Orifice)

North American Mfg. Co., 4455 E. 71st St., Cleveland 4, Ohio.

VALVES (Blow-off and Cut-off)

Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Cleveland Vibrator Co., 2828 Clinton Ave., W., Cleveland 13, Ohio.
Wm. H. Nichols Co., Richmond Hill, Long Island 18, N. Y.

VALVES (Oxygen, Acetylene)

Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

VENTILATORS (Roof)

Swartwout Co., 18511 Euclid Ave., Cleveland 15, Ohio.

VENTILATING SYSTEMS

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Joy Mfg. Co., La-Del Division, New Philadelphia, Ohio.
Newcomb-Detroit Co., Inc., 5741 Russell St., Detroit 11, Mich.
Pangborn Corp., Hagerstown, Md.
Propellair Inc., Springfield, Ohio.
Ross Engineering Corp., J. O., 370 Madison Ave., New York 17, N.Y.
Schneible Co., Claude B., 2627—25th St., Detroit 16, Mich.
Swartwout Co., 18511 Euclid Ave., Cleveland 15, Ohio.

VENTILATING SYSTEMS (Cont'd.)

W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, O.
Westinghouse Electric Corp., B. F. Sturtevant Div., 40 Wall St., New York 4, N. Y.

VENTS (Core Box)

Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Demmler & Bros., Wm., Kewanee, Ill.
C. M. Smillie & Co., 1100 Woodward Hgts. Blvd., Ferndale, Mich.
Landis Mfg. Co., 2305 Hilton Rd., Ferndale, Mich.

VIBRATION REDUCTION PADS

Fabreeka Products, Inc., 222B Summer St., Boston, Mass.

VIBRATORS

Adams Co., Dubuque, Iowa.
Beardsley & Piper Co., 2424 No. Cicero, Chicago 39, Ill.
Cannon Vibrator Co., 111 Power Ave., Cleveland 14, Ohio.
Cleveland Vibrator Co., 2828 Clinton Ave., W., Cleveland 13, Ohio.
Davenport Machine & Foundry Co., Davenport, Iowa.
Dallett Co., 165 West Clearfield, Philadelphia, Pa.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago 14, Ill.
Freeman Supply Co., 1152 Broadway, Toledo 5, O.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.
New Haven Vibrator Co., 131 Chestnut St., New Haven 7, Conn.
Nichols Co., Wm. H., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
S P O Incorporated, 7500 Grand Division Ave., Cleveland 5, O.
Syntron Company, Homer City, Pa.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

VIBRATORS (Core Bench)

Cleveland Vibrator Co., 2828 Clinton Ave., W., Cleveland 13, Ohio.

WASH ROOM EQUIPMENT

Bradley Washfountain Co., Box 732, Milwaukee 1, Wis.

WATER COOLERS (Electric)

Ebco Mfg. Co., 401 W. Town St., Columbus 8, Ohio.

WAX (Core, Vent, Pattern)

United Compound Co., Inc., 328 South Park Ave., Buffalo 4, N. Y.

WEDGES (Foundry)

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

WELDING GAS

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.
Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

WELDING APPARATUS (Electric Arc)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Lide Air Products Co., 30 E. 42nd St., New York 17, N. Y.
Westinghouse Electric Corp., Pittsburgh 30, Pa.

WELDING and CUTTING APPARATUS and SUPPLIES

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.
Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

WELDING ELECTRODES (Carbon)

National Carbon Co., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.

WELDING RODS & ELECTRODES

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.
International Nickel Co., Inc., 67 Wall St., New York 5, N. Y.
Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

WHEELBARROWS

Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

WHEELS, ABRASIVE (Cut-off)

Bay State Abrasive Products Co., Westboro, Mass.
Bridgeport Safety Emery Wheel Co., Inc., Stratford, Conn.
Carborundum Co., Perth Amboy, N. J.
Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
Independent Pneumatic Tool Co., Aurora, Ill.
Norton Company, Worcester 6, Mass.
Peninsular Grinding Wheel Co., 729 Meldrum Ave., Detroit, Mich.
Raybestos Manhattan, Inc., Manhattan Rubber Division, Passaic, N. J.
Simonds Abrasive Co., Tacony & Fraley Sts., Philadelphia 37, Pa.
Sterling Grinding Wheel Division, Cleveland Quarries Co., Tiffin, Ohio.

WHEELS (Wire)

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.

WIRE BENDERS

Redford Iron & Equipment Co., 21315 W. McNichols Rd., Detroit, Mich.

WIRE BRUSHES

Independent Pneumatic Tool Co., Aurora, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.

WIRE CUTTERS

Redford Iron & Equipment Co., 21315 W. McNichols Rd., Detroit, Mich.

WOODWORKING MACHINERY

Do All Company, Des Plaines, Ill.
Freeman Supply Co., 1152 Broadway, Toledo 5, O.
Oliver Machinery Co., Grand Rapids 2, Mich.
Parks Woodworking Machine Co., 1546 Knowlton St., Cincinnati 23, Ohio.

X-RAY EQUIPMENT

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
General Electric X-Ray Corp., 4855 West McGeoch Ave., Milwaukee 14, Wis.
Westinghouse Electric Corp., Pittsburgh 30, Pa.

X-RAY FILMS

Eastman Kodak Co., Rochester, N. Y.
General Electric X-Ray Corp., 4855 West McGeoch Ave., Milwaukee 14, Wis.

ZINC

American Smelting & Refining Co., 120 Broadway, New York 5, N.Y.

—When writing advertisers, please mention THE FOUNDRY—

Classified Advertising

Help Wanted

ENGINEERING GRADUATE

Excellent opportunity for an ambitious, engineering graduate with good business background, under 35 years of age interested in learning and making the malleable foundry business his life work. This is a permanent connection and not for dreamers or floaters. Experience desirable but not strictly essential. Midwest location. Write fully giving experience and other pertinent information. Also enclose recent photograph.

BOX 994

THE FOUNDRY CLEVELAND 13, OHIO

SALESMAN WANTED

Foundry supply manufacturer has opening for salesman with practical foundry experience. Protected territory will be assigned on salary and bonus basis. Application should include age, foundry and sales experience, salary expected, availability. This is an opportunity to form a permanent connection with one of the fastest growing companies of its kind. Our organization knows of this ad and all replies will be held in strictest confidence.

BOX 967

The FOUNDRY CLEVELAND 13, OHIO

GENERAL MANAGER

PRODUCTION GREY IRON FOUNDRY

Outstanding opportunity for man experienced in Production Grey Iron Foundry operation to assume General Managership of foundry in Pittsburgh district with annual volume in excess of $4,000,000.00. Salary and liberal bonus arrangement will give right man, very substantial earnings. Prefer applicant under 45.

BOX 964

The FOUNDRY CLEVELAND 13, OHIO

EXPERIENCED MAN

Capable of taking complete charge of an old established brass ingot and nonferrous smelting plant located in Chicago. Assured future and excellent opportunity for right man. Please state background and qualifications in application. Our men know of this ad. Address: Box 974, The FOUNDRY, Cleveland 13, Ohio.

Help Wanted

PATTERN LAYOUT MAN

Experienced on layout plate. Address: Box 962, The FOUNDRY, Cleveland 13, Ohio.

GENERAL FOUNDRY FOREMAN

Experienced foreman to run well equipped gray iron foundry in business 41 years, producing light and heavy squeezer and floor, production and jobbing castings. Should have ability to handle men, read blue prints, make quality castings. Opportunity for permanent valuable connection. Give background, references, age. Address: Box 957, The FOUNDRY, Cleveland 13, Ohio.

SALES ENGINEER

Old established firm has opening for young engineer with foundry or foundry equipment sales experience selling top lines of foundry equipment in expanding Southwest area. Address: Box 989, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY INSTRUCTOR

In an engineering college. Must have had two years of college work with metallurgical courses and some trade experience in foundry work. College graduate preferred. Address: Box 972, The FOUNDRY, Cleveland 13, Ohio.

FOREMAN

Wanted for floor molding department in foundry. Must be acquainted with large castings capable of planning work in advance. Address: TEXAS ELECTRIC STEEL CASTING COMPANY, P. O. BOX 1418, HOUSTON 1, TEXAS.

EXPERIENCED CORE MAKER

To take charge of modern production burner core room. Address: Box 993, The FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

FOUNDRY FOREMAN

Desires connection with a progressive concern. 24 years' practical experience in all phases of grey iron to malleable operations in supervision of handling men and reducing scrap costs. Can handle job however large or small. References submitted upon request. Address: Box 998, The FOUNDRY, Cleveland 13, Ohio.

ALUMINUM PERMANENT MOLD FOUNDRY ENGINEER

TWENTY-FIVE YEARS' EXPERIENCE. COOKING UTENSIL SPECIALIST OR ANYTHING YOU WANT MADE. FULL OR PART TIME ADDRESS: BOX 667, THE FOUNDRY, CLEVELAND 13, OHIO.

FOUNDRY EXECUTIVE

Capable, progressive grey iron foundryman now employed desires to make a change. Have 23 years of experience covering all phases of the business. Understand foundry costs thoroughly and can apply this knowledge to very good advantage. Desires to make a contact with an organization who wishes to secure ambitious, capable and honest man. Age 44 years. Address: Box 876, The FOUNDRY, Cleveland 13, Ohio.

PATTERNMAKER

Thirty years' experience wood and metal. Capable of taking over shop as working foreman and teaching apprentices to get days work in shop. Address: Box 990, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERVISOR

Desires connection with jobbing and production foundry. 30 years as molder and foreman. Now superintendent in foundry pouring 35 to 40 ton per day. Address: Box 912, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN—SUPERVISOR

Over 17 years' foundry experience. Desire new connection. Experienced in steel and alloyed cast iron. Served as supervisor, control of foundry and core sands. Familiar with general melting practice, foundry equipment, methods and cost. Will gladly give additional information by letter. Personal interview respectfully requested. Address: Box 848, The FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

PRODUCTION PLANNING

Young foundryman, married, desires position in the production planning department of progressive firm. Nine years' experience in the foundry, last five years in charge of planning for large valve concern in brass, iron and steel. Address: Box 951, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT
OR
GENERAL FOREMAN

Practical man, 25 years' executive experience in grey iron jobbing shops making light, medium and heavy work. Now employed. Address: Box 950, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

A-1 foundryman, practical with many years' experience in grey iron, semi-steel, brass, bronze and aluminum castings. Preferred southern or west coast states. Employed as foundry superintendent with good knowledge of ferrous and nonferrous practices, also centrifugal and precision castings. Address: Box 887, The FOUNDRY, Cleveland 13, Ohio.

STANDARDS AND METHODS

Desirous of obtaining position as supervisor of standards and methods, also assist management in operation of plant. Twenty years' experience in malleable, steel, grey iron and aluminum foundries. Can reduce cost without labor interference and increase production. Want connection with aggressive company appreciating past experience of foundry knowledge and also company interested in progress against any competition. Prefer South or far West. Address: Box 984, The FOUNDRY, Cleveland 13, Ohio.

PERMANENT MOLD DESIGN

Aluminum castings. Seeking position with established foundry or setting up new foundry. At present employed as designer by large foundry. Can bring key men. Must have opportunity to buy in. Address: Box 987, The FOUNDRY, Cleveland 13, Ohio.

CLEANING ROOM FOREMAN

Young man desires position with progressive foundry. East or Midwest preferred. Thoroughly experienced in handling small and medium sized carbon and alloy electric steel castings. Address: Box 997, the FOUNDRY, Cleveland 13, Ohio.

CORE ROOM SUPERINTENDENT

Twenty-five years' experience in all kinds of core making. Rigging for any kind of core room machinery and sand mixing for all types of cores. Address: Box 986, The FOUNDRY, Cleveland 13, Ohio.

METAL PATTERN MAKER

Thirty-eight years' progressive experience planning, supervising and designing, specializing in modern matchplates and core blowing equipment to get highest production. Address: Box 995, The FOUNDRY, Cleveland 13, Ohio.

TECHNICAL EXECUTIVE

Administration of research and technical control in foundry and general manufacturing. Broad experience in casting and manufacturing of nonferrous, cast iron and steel pressure containing parts. Established reputation in foundry and welding technology, technical control and new materials development. Fully familiar with code requirements. Age 41. Ph.D. degree in metallurgy from leading university. Address: Box 929, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER

15 years' experience covering all phases of steel foundry operation, including application of wage incentives, labor relation and cost control as well as molding, melting, etc. Metallurgical Engineering graduate. Age 38, married. Now employed as general works manager. Address: Box 958, The FOUNDRY, Cleveland 13, Ohio.

MASTER MECHANIC

Master mechanic and maintenance head of foundry and machine shop. 14 years' experience. Reliable references gladly furnished. Address: Box 899, The FOUNDRY, Cleveland 13, Ohio.

Classified Advertising

Positions Wanted

GENERAL MANAGER

With long, valuable experience in managing, building up and maintaining foundry and machinery business on profitable basis, invites correspondence preliminary to interview. Ability to direct all office, sales, financial and production activities efficiently and economically unquestionably established by previous record. Address: Box 946, The FOUNDRY, Cleveland 13, Ohio.

METALLURGIST—FOUNDRYMAN

Young, technical and practical background. Seven years' experience in founding of pressure tight aluminum permanent mold and brass and aluminum sand castings. Work history includes direct supervision over aluminum heat treating, foundry and laboratory control operations. Seek position as assistant to chief metallurgist or plant superintendent. Address: Box 985, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Practical iron foundryman. Technically trained. Experienced all phases iron casting production by partial or complete mechanization. Had charge of first class foundries producing up to 125 tons daily. Knows laboratory control of operations, costs and industrial relations. Competent estimating and contacting buyers. East or Middle West. Address: Box 980, The FOUNDRY, Cleveland 13, Ohio.

STEEL FOUNDRYMAN

To act in capacity of assistant to foundry superintendent or works manager with 20 years' experience in all phases of foundry work. Producing steel castings ranging from 1 pound to 3 tons. Good knowledge of foundry equipment, plant layout, foundry methods and high speed mechanized production. Thoroughly familiar with heading and gating and rigging of patterns for production, sand control, etc. Also good knowledge of molding and coremaking. Capable of handling men. Address: Box 975, The FOUNDRY, Cleveland 13, Ohio.

CORE ROOM SUPERVISOR

Capable of setting up and operating core department. Experienced in all latest type equipment. Excellent labor relations record. Gray iron and steel. Available June 15. Address: Box 979, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY METHODS ENGINEER

Desires appointment with principals of concerns now operating one or more foundries who believe their present methods could be improved. My past experience as superintendent of several prominent foundries covers all details of present day foundry procedure from prints to good castings. An appointment for interview is requested. Address: Box 969, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Progressive young engineer, 35 years of age, experienced and interested in using modern methods, production control and quality control in the foundry for improved costs, increased production, lower scrap and less finishing. Executive background in pattern, sand, core and molding operations. Address: Box 996, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY EXECUTIVE

DESIRES CONNECTION WITH PROGRESSIVE FOUNDRY. AGE 42, MARRIED. 22 YEARS' PRACTICAL EXPERIENCE IN CASTING STEEL, HIGH ALLOYS AND IRON. SEVEN YEARS IN RESPONSIBLE POSITIONS WITH EXCELLENT RECORD. AT PRESENT TIME SUPERINTENDENT IN MID-WESTERN COMPANY. ADDRESS: BOX 814, THE FOUNDRY, CLEVELAND 13, OHIO

FOUNDRY FOREMAN OR SUPERINTENDENT

Capable grey iron foundryman experienced in all departments of light to medium grey iron and steel, jobbing or production. Address: Box 955, The FOUNDRY, Cleveland 13, Ohio.

GRAY IRON FOUNDRY MANAGER OR SUPERINTENDENT

Thoroughly versed in all departments, technical and practical. Maximum results guaranteed. Middle age, married and good health. Address: Box 924, The FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

GRAY IRON FOUNDRY SUPERINTENDENT OR FOREMAN

25 years in foundry. Can handle squeezer, jolt and rollover, jobbing or conveyor molding. Eight years in last position. Address: Box 971, The FOUNDRY, Cleveland 13, Ohio.

PLANT MANAGER

Foundry, machine and fabricating. Excellent record in operations, production planning, engineering sales, industrial relations and purchasing. Will stand critical inspection. Address: Box 960, The FOUNDRY, Cleveland 13, Ohio.

METAL PATTERN MAKER

Ability to cut cost of your pattern and core box equipment, especially on long steady runs. Would appreciate hearing from you at once. Will go anywhere. Address: Box 992, The FOUNDRY, Cleveland 13, Ohio.

Accounts Wanted

Experienced foundryman with following, now covering Iowa, Missouri and Illinois wants one or two additional, substantial nonconflicting lines. Devoting full time to territory. Offer must have reasonable earning possibility. Address: Box 968, The FOUNDRY, Cleveland 13, Ohio.

MANUFACTURERS REPRESENTATIVE

Now calling on over 100 foundries in Iowa and Western Illinois wants additional items on commission basis. Address: Box 953, The FOUNDRY, Cleveland 13, Ohio.

Opportunities

90 PER CENT OF THE CUPOLAS MELT UP TO ONLY 50 TO 60 PER CENT

capacity per hour—although the best and hottest iron is produced only when cupola is operated to its capacity. Report on your cupola may prove an eye-opener—usually the savings are surprising. Every pound of steel used in cupola mixtures reduces cost and increases strength 20 to 60%, because steel is purer than the most expensive pig iron. Watch the scrap pile—statistics prove casting losses can be held between 1 to 5% depending on the line of work. Our system is not an expense—but a valuable investment. Synopsis free.

McLAIN'S SYSTEM INC.
236 E. NORTH AVE.
MILWAUKEE, 12, WIS.

GREY IRON CASTINGS

A successful design engineer is seeking a connection with a foundry having a medium size machine shop or surplus machining capacity who is interested in a product (sales-tested) to manufacture. Principals only. Interview necessary. Address: Box 970, The FOUNDRY, Cleveland 13, Ohio.

MANUFACTURERS

Foundry cast-alloy products, novelty one to three-way swivels. Will sell well to industrial and consumer fields. Royalty license basis. Address: FRED ANDERSON, BOX 567, SHERIDAN, OREGON.

OPPORTUNITY

Texas foundry offers an experienced foundryman a chance to purchase part interest and to operate business. You must know how to make quality brass and iron. We have the business if you have the know-how to produce at a profit. Address: THE SUN FOUNDRY AND SUPPLY CO., EL PASO, TEXAS.

OPPORTUNITY

We can furnish at any point slack, fibre and tight barrels; also fibre and steel drums. Address: BUCKEYE COOPERAGE COMPANY, 3807 ORANGE AVENUE, CLEVELAND 15, OHIO.

Manufacturer's Agents

MANUFACTURER'S AGENT

Well established foundry with jobbing and production facilities for bronze sand castings and aluminum in sand and permanent mold desires business connection with reputable manufacturer's agent now covering metropolitan area (excluding New Jersey and Southern New England (preferably one now handling other types of castings.)

BOX 954
THE FOUNDRY CLEVELAND 13, OHIO

REPRESENTATIVES

Who sell direct to nonferrous metal foundries. Exclusive territory—very good commission. Give particulars about your present setup. Address: Box 961, The FOUNDRY, Cleveland 13, Ohio.

CORE OIL DISTRIBUTORS

We want sales representation in Detroit, Cleveland, Buffalo, Boston, New York and Philadelphia territories to sell our complete line of core oils. Write us at once. Address: BOX 978, THE FOUNDRY, CLEVELAND 13, OHIO.

Foundry Consultant

ATTENTION: GRAY IRON FOUNDRIES

Are you having cupola trouble such as cold iron, slow melting, a low melting ratio, extreme lining burning? Write for circular. Address: MR. HENRY MESSER, 1117 WILLOW AVE., SOUTH SAN FRANCISCO, CALIFORNIA.

Foundries For Sale

CALIFORNIA FOUNDRY
IDEAL CLIMATIC CONDITIONS

One of the largest privately owned iron foundries in the State. $40,000 will buy entire set-up. Owner will give long term lease on new buildings and 2 acres land at $400.00 per month. Located in thriving San Joaquin Valley mid way between Los Angeles and San Francisco. Only experienced Foundry men need apply. Contact owner for further particulars.

WRITE, PHONE OR WIRE
WM. E. HOWE
TULARE FOUNDRY TULARE, CALIF.

GRAY IRON FOUNDRY

Fully mechanized for quantity production. Good organization.

EDWARD H. ZOLL
INDUSTRIAL PROPERTIES THROUGHOUT THE EAST
790 BROAD ST. NEWARK 2, N. J.

FOUNDRY FOR SALE

Brass and aluminum jobbing foundry located in Philadelphia, Pa. Capacity 60 to 80,000 pounds, per month. Completely equipped and operating. Room for expansion. Immediate possession.

M. H. CARSON & SON
604 Spring Garden St.
Philadelphia 23, Pa.

NONFERROUS FOUNDRY FOR SALE

By owner, near Cleveland. Well established business. Equipped for sand and permanent mold casting. Four 300 lb. furnaces, two molding machines, core oven, band saw, grinders, etc. New 42 x 80 block building. Property and dwelling complete. $35,000. Address: Box 982, The FOUNDRY, Cleveland 13, Ohio.

GRAY IRON FOUNDRY FOR SALE

Located in the Piedmont section of North Carolina. 10,000 sq. ft. of floor space. Concrete block and steel building, completely equipped with squeezers, sand blasting and shot cleaning equipment. $50,000 will finance. Address: Box 942, Cleveland 13, Ohio.

Classified Advertising

Foundries For Sale

FOUNDRY FOR SALE

Located in Michigan in city of 175,000 population, centrally located. Foundry and yards cover ¾ of block area. Capacity 25 tons per day of light squeezer castings. Buildings in first class condition. Overhead charger, 20,000 sq. ft. of molding space, 24,000 sq. ft. of core room and storage space. Gas ovens, core blowers, sand mixers. Separate building with 3600 sq. ft. of storage and pattern millwright and corpenter shop equipped. Address: Box 853, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Gray iron foundry, Northeastern Oklahoma. Operated continuously since 1910. Fully equipped, leased rail siding, pattern coke and sand storage. Doing good business. Address: Box 840, The FOUNDRY, Cleveland 13, Ohio.

MODERN ALUMINUM FOUNDRY

For sale or lease. New building and mechanized equipment. Located in middle of tractor manufacturing area. Reason—death of owner. Address: Box 892, The FOUNDRY, Cleveland 13, Ohio.

Open Capacity

GRAY IRON CASTINGS

Open Capacity Available

Inquiries Solicited

TREDEGAR COMPANY

RICHMOND 11, VIRGINIA

OPEN CAPACITY

Available in aluminum foundry located in Eastern state. Bench and floor work. Address: Box 988, The FOUNDRY, Cleveland 13, Ohio.

AVAILABLE CAPACITY

Our foundry has open capacity to supply small and medium size gray iron castings. Send sample. Address: OREGON CASTINGS CO., RD 3, Lititz, Pa.

PATTERNS

Central Illinois pattern shop has open capacity for wood and metal patterns. Match plate and cope and drag equipment for production work with core driers complete. Address: Box 991, The FOUNDRY, Cleveland 13, Ohio.

OPEN CAPACITY

Foundry capable of handling 500 tons grey iron per month in Eastern Massachusetts. Will lease to large user or operate for production of one company as its own foundry principals only. Address: Box 965, The FOUNDRY, Cleveland 13, Ohio.

OPEN CAPACITY

Open capacity in grey iron foundry. Waterfronts—burners—bench, pumper and floor work Address: P.O. Box 321, Belleville, Illinois.

Wanted-To-Buy

WANTED

TUMBLING BARRELS

For removing cores, separating castings from gates and preliminary cleaning of castings in foundry. Give complete information in reply.

BOX 936

THE FOUNDRY CLEVELAND 13, OHIO

Wanted-To-Buy

WANTED

We will liquidate or purchase outright, foundry equipment in any quantity. Send us a list of what you have to dispose of. Prompt action guaranteed.

MARCH BROWNBACK CO., INC.
POTTSTOWN, PENNSYLVANIA

WANTED

100 sets of fabricated steel flasks approximately 20 x 46". 12" cope, 12" drag. We are also interested in other sizes.

WASHINGTON FILLMORE FOUNDRY INC.
153 Fillmore Ave.
Buffalo 10, N. Y.

WANTED

1—3 ton electric arc melting furnace transformer and full set of controls.

BOX 976

The FOUNDRY CLEVELAND 13, OHIO

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price for immediate acceptance. Address Box 578, The FOUNDRY, Cleveland 13, Ohio.

SMALL GRAY IRON FOUNDRY

Wanted in New England. Experienced foundryman desires to purchase or lease small gray iron foundry now operating. Will consider managing on a profit sharing or percentage of sales basis. Address: Box 959, THE FOUNDRY, Cleveland 13, Ohio.

WANTED
PATTERNSHOP

Patternmaker wants to buy part interest or complete wood metal patternshop. Experienced and capable of managing shop and showing profit on work. Address: Box 945, The FOUNDRY, Cleveland 13, Ohio.

WANTED

One—8 x 10 foundry shakeout, Simplicity or Allis-Chalmers preferred. Also one 4' x 10' or 5' x 12' vibrating screen. Address: Box 977, The FOUNDRY, Cleveland 13, Ohio.

WANTED

BILLETS—ROUNDS—SQUARES

ANY DIAMETER

ANY SIZE

ANY ANALYSIS

BOX 966

The FOUNDRY CLEVELAND 13, OHIO

Employment Service

SALARIED PERSONNEL

$3,000—$25,000. This reliable service, established 1927, conducts confidential negotiations for high-grade men who seek a change of connection under conditions assuring, if employed, full protection to present position. Send name and address only for details. Personal consultation invited. Address: JIRA THAYER JENNINGS, 241 ORANGE STREET, NEW HAVEN 10, CONN.

SALARIED POSITIONS
$3,500—$35,000

If you are considering a new connection communicate with the undersigned. We offer the original personal employment service (38 years recognized standing and reputation). The procedure, of highest ethical standards, is individualized to your personal requirements and develops overtures without initiative on your part. Your identity covered and present position protected. Send only name and address for details.

R. W. BIXBY, INC.
101 DUN BLDG. BUFFALO 2, N. Y.

EMPLOYERS SERVICE BUREAU
FREE
EMPLOYMENT SERVICE
No Charge Whatever
To Applicant
Partial List of Open Positions:

SUPERINTENDENTS	To $10,000
GENERAL FOREMEN	To $ 6,000
MELTING FOREMEN	To $ 6,000
CORE FOREMEN	To $ 6,000
MOLDER FOREMEN	To $ 6,000
CLEANING ROOM FOREMEN	To $ 6,000
INDUSTRIAL ENGINEERS	To $ 7,200
TIME STUDY ENGINEERS	To $ 4,800
MASTER MECHANICS	To $ 6,600
PLANT ENGINEERS	To $ 6,000
METALLURGISTS	To $ 5,200
CHEMICAL ENGINEERS	To $ 4,800
CHEMISTS	To $ 4,200
PRODUCTION CONTROL	To $ 4,800

If YOU are experienced in any phase of foundry operations—and desire to improve your future working conditions:

WRITE
EMPLOYERS SERVICE BUREAU
33 WEST WASHINGTON ST.
CHICAGO 2, ILL.

For Sale

FOR SALE

2—American Foundry Equipment Co. sand cutters, type k, 8 ft. with 25 HP motors.
1—Type AA—7 ft. with 15 HP motor, full description given in first letter.

BOX 981

The FOUNDRY CLEVELAND 13, OHIO

FOR SALE

1—Jeffrey SF portable sanditioner, type P with 2 HP motor, 3 phase, 60 cycle 220 volt. Address: Box 983, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

1—6,000 pound capacity Timken worm gear crane ladle with "V" bail, riveted steel trunnions and solid outside teapot spout. Never used. Address: E. J. WOODISON CO., 7415 ST. AUBIN AVE., DETROIT 11, MICH.

FOR SALE

One 12" L.J.S. International post jolt squeezer molding machine. Excellent condition. Attractive price. Address: CALUMET STEEL CASTINGS CORP., HAMMOND, INDIANA.

FOR SALE

Pillar type cranes, new Shaw box type SSJ, 4000# capacity, 20' boom, full revolving 15' under Boom, complete with model HC chain hoist. $800 ea. f.o.b. Address: PLANT EQUIPMENT CO., 946 BETTS STREET, CINCINNATI 14, OHIO.

FOR SALE

No. 2 Climax core rod straightener. Used very little, $350.00. Address: Illinois Foundry Co., Springfield, Ill.

Classified Advertising

For Sale

FOR SALE

Machine shop tools released for private industry:— 36" band saw $225. 30" band saw $275. 32" band saw with built-in 220/3/60 motor $500. Pressure blower 1½" pipe size $20. Time clock for 100 employees $50. 25" disc grinder like new $250. Pangborn small sand blast outfit $230. Flexible shaft grinder 220/3/60 motor, like new $120. 24" x 10' engine lathe $490. 24" x 8'—$340. 18" x 8'—$240. Money back guarantee. Address: CONVERSION PARTS CO., 288 Adams St., Boston 22, Mass.

FOR SALE

1—18" x 25" Roots-Connersville positive pressure blower with 125 H.P. motor.
1—Motor operated Butterfly valve.
4—3 Ton Whiting steel converter shells with 2 tilting assemblies.
1—Champion 48" x 48" x 8" draw power flask push-off machines.
1—Osborn Jolt, rollover, draw molding machine.
5—Osborn Jolt strip molding machines.
2—Nichols Jolt, squeeze molding machine.
1—Nichols Jolt table.
2—Osborn Jolt, rollover squeeze molding machine.

GUNITE FOUNDRIES CORP.
ROCKFORD, ILL.

SURPLUS SAND BLASTING EQUIPMENT
FOR SALE

American Wheelabrator tumblast 27" x 36", work area 24" x 26"—Price $1700.

Wheelabrator No. 1, Multitable—Price $1100.

American suction cabinet 60" x 36" x 36", model 2 with dust collector, blower and electric motor—Price $400.

Pangborn cabinet, EN 2, 6' long x 3 ft. deep by 7'1" high with dust collector, blower and motor—Price $375.

Pangborn rotoblast table 4' multiple spindle 1 LG—Price $900.

Pangborn blast cleaning barrel, suction feed, type GF drum 24" x 15"—Price $400.

American Wheelabrator dust collector No. 65A capacity 2160 CFM, 2 hopper—Price $400.

American Wheelabrator dust collector No. 85 capacity 2880 CFM—Price $450.

Pangborn CH 623, 5600 CFM—Price $750.

American Wheelabrator dust collector type 45 capacity 3760 CFM with power house—Price $850.

M. ELSTEIN
141 MANGIN ST. NEW YORK 2, N. Y.

FOR SALE

1—#559 Osborn jolt stripper moulding machine.

1—#444 Osborn jolt rockover pattern draw moulding machine.

Both machines new, have never been used.

SCHILL MANUFACTURING COMPANY

CRESTLINE, OHIO

FOR SALE

Patterns and stock on hand for A 1-2-3 burner gas hot plate and A 2-3 burner. Laundry stove with 18-30 inch legs. Cuts can be mailed showing line of stoves. Address: Box 952, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

One—Ingersoll-Rand cupola blower 2200 cmf at 16 oz. pressure with 15 HP 220 volt motor, purchased new in 1944 and never been used. Also one used #3 Whiting cupola. Address: BEDFORD FOUNDRY & MACHINE CO., BEDFORD, INDIANA.

For Sale

SAND BLAST MACHINES

We have in stock three brand new complete portable sand blasting machines 100 pound, 350 pound and 650 pound capacity in sand. Can be used with steel grit also. New "Sanstorm" type, non-clogging design. Ideal for auto body shops, foundries, heat treaters, painters and forge shops. We also have in stock for immediate shipment a #22 Moline portable molding machine (brand new) also a used belt drive tilting tumbling barrel.

FEDERAL FOUNDRY SUPPLY COMPANY
4600 EAST 71st ST. CLEVELAND 5, OHIO

FOR SALE

2—Slightly used J & J No. 681-C Portable Jolt-Strippers, table size 24 x 30", 8" pattern draw, 600# jolt capacity.

3—Used Hones AM-200 BUZZER Aluminum Melting Furnace, 200# capacity.

2—Used Stand Grinders. Each handles two 16" dia. 1½" bore wheels, 42" from center to center; 33" from floor. Equipped with 5 HP G.E. 1750 rpm. 220 volt, 3 phase motors.

FOUNDRY SUPPLY CO., INC.
404 SOUTH THIRD ST.
MINNEAPOLIS 15, MINN.

ELECTRIC FURNACE

Detroit rocking electric furnace, type AA, conical shell (with spare) 400 K.W. input, 1000 lb. cold 2500 lb. molten capacity, with 531 K.V.A. single phase 60 cycle transformer, 11,800 volt primary voltage, circuit breaker control panel 440 volt, 3 phase rocking motor, etc. Automatic electrode control. Price—$7000.00.

S. R. VANDERBECK
731 COMMERCIAL TRUST BUILDING
PHILADELPHIA 2, PA.
RITTENHOUSE 6-9288

FOR SALE

TWO AIR COMPRESSORS

General Electric, Type TS, Serials No. 5817931 and 6055717, 250 HP, unity PF, 4160 volt, 277 RPM, 200 KVA, synchronous Motor Ingersoll-Rand Twin Compressor, 21" x 14" x 13" x 14"—Discharge on after cooler 200 psi. Used 17 months during war.

ANDERSON STOVE CO., INC.

1301 W. 16th ST. ANDERSON, INDIANA

FOR SALE
TESTING MACHINE

Baldwin-Southwark Model S-10-C, Bulletin No. 182. This testing machine has just been returned from the manufacturer, Baldwin Southwark Division, Baldwin Locomotive Works, Philadelphia, Pa., where it has been completely overhauled and calibrated. It is still in packing case from the manufacturer.

APEX SMELTING COMPANY
6700 GRANT AVE. CLEVELAND 5, OHIO

FOR SALE

SHAKEOUT—Robins Floatex unit "JF6" 36 x 60. Complete with motor. New.
DUST COLLECTOR—Dustkop unit with motor. New.
LADLES—150# and 1000#; 2½ ton Geared ladle. Used.
FLASK—Assortment wood snap, some nearly new; 15" x 18" Cast Iron; 13" x 18" Steel Flask.

HILLSDALE FOUNDRY CO.,
HILLSDALE, MICHIGAN

FOR SALE

5—Osborn #602 jolt rollovers—$650 each.
4—Royer sandblenders.
2—Screenerators.
1—Spencer Turbo blower 1300 cfm @ 32 oz., 25 HP 220 VAC, GEmotor.
1—Osborn #91 coreblower.
1—Genrich continuous horizontal oven.
1—Jeffrey portable sand conditioner.
2—Bellevue #52f aluminum melting furnaces.
2—Magnetic pulleys.
1—Osborn #243 jolt rollover pattern draw machine—perfect condition.
4—Gardner 3D polishing lathes.
1—Beardsley & Piper speedmuller #40 without motor.

MARCH-BROWNBACK CO.
POTTSTOWN, PA.

GOOD USED EQUIPMENT

Sly Dust Collecting System, consisting of 3 Sly #62 Dust Filters to handle 15,000 CFM each. Motors, 220/440 volt, 3 ph. 60 cycle. Was erected, but not used.
6-ton Northern 46' span, 2 motor, 230 volt DC Bridge Crane. Rope floor controlled.
Hassel Direct Safety Foundry Swing Grinder. Motor 230 volts DC.
10 HP, P&H Ball Bearing Crane Motor, 230 volts 675 RPM.
50 KW, GE Motor Generator Set, complete with Switchboard.

IRA C. JORDAN
2508 EAST BELLEVIEW PLACE
MILWAUKEE 11, WIS.

FOR SALE

Dual 5' x 8' Simplicity shakeout—One unit variable speed. Hopper and conveyor apron feeder included. Address: 973, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

New heavy duty motorized rod cutter, 65 cuts per minute; capacity: ¾ inch round hot rolled steel. Brand new. $890.00 f.o.b. Cleveland. Address: The Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio.

FOR SALE

2—No. 612-B Johnston & Jennings rollover machines.
2—No. 125-3 Milwaukee Jolt Strippers.
Good condition. Subject to prior sale

GERLINGER EQUIPMENT, INC.
610 WEST MICHIGAN ST. MILWAUKEE, WIS.

FOR SALE

1—18" Walker York Furnace
2—22" Walker York Furnaces
2—#610 Clearfield, 6' dia. mixers

BOX 956
THE FOUNDRY CLEVELAND 13, OHIO

FOR SALE

3—Haynes semi circle core ovens complete with legs and fire box less grates. 4—7" doors 1—10" door, 22" deep.

MUNRO VAN HELMS COMPANY
BOX 273
TALLADEGA, ALABAMA

FOR SALE

Used Colliau Cupola—60" shell diameter—complete with blower, motor, starter and metal duct work for blower.

THE BETTENDORF COMPANY
BETTENDORF, IOWA

FOR SALE

Eight foot Sly Centi Blast Table.

WASHINGTON FILLMORE FOUNDRY INC.
153 Fillmore Ave.
Buffalo 10, N. Y.

Classified Advertising

For Sale

FOR SALE

3—G. E. TRANSFORMERS
No. 1—2239839
No. 2—2239838
No. 3—2239837
Volts 16500—120
200 KVA
Circular Coil Type

3—WESTINGHOUSE SINGLE PHASE TRANSFORMERS
No. 1—526057
No. 2—526058
No. 3—526056
Volts 15000—120
250 KVA
300 Gals. of Oil

3—WESTINGHOUSE CURRENT TRANSFORMERS
Type H-2.5
5000 to 5 Amp.
60 Cycles
Style #1293837
Line Volts 2500

3—WESTINGHOUSE AMP. METERS
Type #76018—1
Style 701050
Amps. 0-5000

PHILLIPS FOUNDRY CO.
P. O. BOX 82 BAKERSFIELD, CALIF.

FOR SALE

1 TANNEWITZ DI SAW and Filing Machine. Model 24M, Adjustable table, speed selector, band saw welding attachment, complete equipment, motor driven, same as new $850.00
1 BAND SAW FILER — Foley, bench type, with ¼ hp motor. Excellent condition 75.00
1 EXHAUST HOOD—40" x 43" with 14" flue pipe. ¼ hp motor, 10" fan. Same as new 50.00
1 SPRAY BOOTH—Complete with motor 125.00
2 TABOR SQUEEZERS—18" x 20" table, 10" cylinder, each 40.00
3 OSBORNE SQUEEZERS—16" x 18" table, 10" cylinder, each 50.00
15 STERLING STEEL FLASKS—Priced to sell
ALL MOTORS, 220V, 60 CYCLES, AC, 3 PHASE

OPW CORPORATION 2735 COLERAIN AVE.
CINCINNATI 25, OHIO

---

6 ton Capacity

HEROULT ELECTRIC FURNACE

Tilting Type

1, 6 ton shell—1, 3 ton shell

Complete with all electrical controls.

IRON & STEEL PRODUCTS, INC.

43 years' experience

13444 S. Brainard Ave., Chicago 33, Ill.

"*ANYTHING* containing IRON or STEEL"

SURPLUS FOUNDRY EQUIPMENT FOR SALE

Milwaukee Foundry Equipment molding machine, jolt with lift pin, lift 44" x 48". Price $1300.
Johnson & Jennings Molding machine model STP pit 30" x 36" table 1200 lbs. at 80 lbs. pressure No. 2.
Tabor power draw machine, stationary 30', power rollover, 30" x 14". Price $500.
Tabor core machine rollover pedestal, type air 8" draw 16 x 24 x 12. Price $105.
Demmler core blowing machine, pneumatic 10" x 43". Price $1000.

CONSOLIDATED ELECTRIC & AIR PUMP CO.
141 MANGIN ST. NEW YORK 2, N. Y.

WHITING SIDE BLOW CONVERTERS

Two 3-ton side blow converters complete with blower, motors and accessories. Immediate delivery.

INTERNATIONAL FERMONT MACHINERY CO., INC.
111 BROADWAY, NEW YORK 6, N. Y.

For Sale

FOR SALE

Schutte & Koerting tumbling and washing barrel, inside dimension of barrel 24" deep, 28" wide, 1⅜" bronze $450.00
Glove tumbling barrel, 3 HP motor 220/440/60/3, push button control 175.00
Nichols portable jolt strip molding machine, 26" x 27" table 275.00
International portable jolt strip molding machine, 16" x 30" table 150.00
Tabor stationary jolt squeeze molding machine, 16" x 16" table 150.00
Roller conveyor, ball bearing, almost new, random lengths, 8 to 10 ft. Per ft. 3.50
Buffalo MX blower, flat belt drive, not motorized 55.00
International portable jolt strip molding machine, 20" x 22" table 250.00
Osborn jolt squeeze molding machine, 14" x 18" table 165.00
Milwaukee portable jolt squeeze molding machine, 17" x 21" table 140.00
Wheelabrator grit, size 25 and size 45 Per lb 4c
Ohio electric ventilating fans, type D-72225, ½ HP motor 1850 RPM 5 amp. DC 35.00
Walter Kidde fire extinguishers, carbon dioxide cylinders, wall system type .. 17.50

BILLARD MACHINE & TOOL CO.
PHONE 44 MANSFIELD, PENNA.

FOR SALE

36 x 42 AMERICAN WHEELABRATOR—Tumblast type. Complete with loader and dust collector.
BEARDSLEY-PIPER SAND SLINGER—Junior Model
#405 OSBORN MOULDING MACHINES — Late Models $1500.00
SIMPLICITY SHAKEOUT 6 x 7
DILATOMETER, #750 Hitembond, complete
Complete foundry units consisting of CORE ROOMS, SAND HANDLING SYSTEMS, MOULDING MACHINES, ETC. to be sold in complete units only.

WE INVITE YOUR INQUIRIES

BALCHER MACHINERY SALES
1819 E. 33rd ST. CLEVELAND, OHIO

FOUNDRY EQUIPMENT FOR SALE

Several 5° Adams Wood Slip Flasks—various sizes.
90—Grey Iron Jackets—various sizes.
6—30" x 60"—Late Model Tumbling Mills—motorized. All of the above nearly new.
1—48" square x 84" long Tumbling Mill—belt driven
2—No. 10 SE-2 Milwaukee jolt squeeze molding machines
1—8" Milwaukee squeezer

DETAILED LIST ON REQUEST

OLIVER CORPORATION, PLANT #1
533 SOUTH CHAPIN STREET
SOUTH BEND 21, INDIANA

FOR SALE

1—Dispatch core oven size 7'6"x9'6" complete with oil burner and electrical controls.
3—Core racks to fit oven.
5—Rapid portable jolt squeeze molding machines.
1—New Whiting skip charger Std. 5-V hoist unit.
1—New Spencer blower #1220 with 20 horsepower motor.
1—Set Foxboro equipment for blower.
1—Royer sand separator model NDP 2 horsepower motor.
1—Std. 23" EZ pour crane ladle V-Bail 1000 lb. capacity.
1—Stock core cutter and shaper.
1—#3 Whiting cupola complete with blower.
1—New Fairbanks platform scale 1000 lb. capacity.
1—Std. spark arrester.
1—#3 ring sill.
1—Standard door frame for #3 cupola with 8.75' bucket.
15—Snap flasks—various sizes.

EAGLE MFG. CO.
APPLETON, WIS.

FOR SALE

Premix Blower Unit with ½ Hp Motor
4 Core racks—Fdry. Equip. Co.
4—3.4 C.P. Superior Stone Tools
2—#3 Master Chipping Hammers
2 Haskins Elec. Flex. Shaft Grinders
1 Cleveland Pneumatic #1B bench rammer
1 Cleveland Pneumatic #1F bench rammer
2 Cleveland Pneumatic #1F bench rammer
1 Cleveland Pneumatic #1F bench rammer
1 Haskins RG5 Flex. shaft grinder
1 Haskins RG5 Flex. shaft grinder
2 Cleveland Pneumatic #1 Bench Rammers
1 Cleveland Pneumatic #1 Bench Rammer
4 Haskins CH4 Flex. shaft grinder
1 Haskins RG5 Flex. shaft grinder
1 Haskins RG5 Flex. shaft ginder
2 Cleveland Pneumatic #1B rammers
Haskins RG5 Flex. shaft grinder
10—¾" Chi. Pneu. Stone Tools
1 Cleveland Pneumatic Bench rammer
4 Haskins Flex. Shft. CH-4
2—275J Osborne Squeeze Jolt Machines Ser. No. 11050-U, 11451-S
1—75 J Osborne Squeeze Jolt Machines Ser. No. 8674-C
4—74 J Osborne Squeeze Machines
2—Roto Cast Revolving Mold Conveyors—12 Ft. dia.
1—Lindberg type 4348-EH electric cyclone heat treat furnace, 66 KW. Complete with two steel baskets. Brown recording and controlling Potentiometer and Wheelco excess temperature protection device. Satisfactory for magnesium or aluminum treatment.
2—8-ft. 2 compartment "Industrial" Hydro whirl dust collectors and polishing booths for magnesium or aluminum alloys.

WELLMAN BRONZE AND ALUMINUM CO.
2525 E. 93rd ST. CLEVELAND, OHIO

FOR SALE

1—#1 Simpson intensive mixer with 5 HP motor.
1—Riehle tensile testing machine, 200,000#.
1—Tinius Olsen 50,000# tensile testing machine with 1 HP motor.
Vibrating screens, single and multiple deck, Tyler Hummer, Allis Chalmers, up to 5' x 10' screen surfaces.
3—Day Roball screens, model 82, 40" x 10' two deck, m.d.

CONSOLIDATED PRODUCTS CO., INC.
13-20 PARK ROW NEW YORK 7, N. Y.

FOR SALE

1—International Draw Down Stripper, YPD, 30" x 72" x 12", Serial #43598—$1,000.00
4—Rollover & Jolting Machines, (Osborn) Air. Model 2047-1, Flask Space, 22½ x 21½—10" Draw—$750.00
1—Model SS Sand Shakeout, Schneible Co., 5' x 3' x 10", Serial No. 43466—$850.00
1—Jeffrey Sanditioner, Serial #4764-0, 133523, with Allis Chalmers 2 HP Motor, 220-440 volts, 3 phase, 60 cycles—$500.00.
1—American Sand Cutter, Type CP, Size 72", Serial #115-R. Distance between wheels 96", Cutting Blades 72", Overall Length 102", 220 volts 3 phase, 60 cycles,—$2,000.00—FOB Reading, Pennsylvania.
163—Dixon #150 Crucibles with 4" Lip—$15.00 each.
All Types of Bucket, Belt, Apron, Chain and Booster Conveyor in Stock at all times.
Also, Roller Conveyors, 10", 12", 14", 16", 18" and 24" wide in standard 8' and 10' lengths. With and Without Stands. Rollers above or below frame as desired.
5—Round End Exhaust Tumbling Mills with 1" Plates
1—Demmler Core Blower, #1, Serial #888. Like New—$650.00
1—Fisher Tilting Furnace, Type SM, 500 aluminum capacity Serial #2517, Swing Cover valves for oil firing Spencer-Turbo Blower, 4-Burners Gas, 1-Burner Oil. Blower has ⅓ HP Single Phase Motor—$600.00. Same can be used for either gas or oil.
1—American Wheelapeen Machine Cabinet, Model BM-79000—$2250.00
2—I.R. Blowers, Single Stage Centrifugal, Type FS-345, 3600 CFM with General Electric Motor, 25 HP, 50-60 cycles, 3/220-440 $1,000.00 each
10—Budgit Cranes assembled in I Beams, 11' Span. Ready to Install. Like New—$100.00 each
1—Tessemer Motorized Power Sprue Cutter—$400.00
600—Electric Motors in Stock, all sizes, types and horsepowers.

Send us your inquiries, we will be more than pleased to submit additional information to you.

UNIVERSAL MACHINERY & EQUIPMENT CO.
320 EAST BROAD ST.
SHILLINGTON, READING, PA.

Classified Advertising

For Sale

FOR SALE
FOUNDRY EQUIPMENT

2—Adams 10" Jolt Squeeze Moulding Machines.
1—Adams 12" Jolt Squeeze Moulding Machine.
1—Champion 10" Jolt Squeeze Moulding Machine.
1—Champion 12" Jolt Squeeze Moulding Machine.
1—Tabor 13" Moulding Machine.
1—Robins Shakeout Screen 36" x 78".
44—Portable Steel Bins, 36 x 60 x 42 with legs.
70—Crucibles—1000 to 5000#.
4—Bellevue Melting Furnaces 14½" Dia. x 21¼" Deep.
200—Steel Pallets 28" x 48" & 28" x 28".
17—2000# Knapp Tilting Furnaces with hoists
2—Osborn #559 Jolt Strippers.
2—Osborn #2033 Rockove & Draw.
1—Union Melt Welder Model CA.

BLOWERS
COMPRESSORS
& VACUUM PUMPS

1—I.R.—HK-500, Pneumatic Tires, Diesel.
1—I.R.—Type 30—4 & 1½ x 3½—5 H.P. Elec.
4—Roots Connersville—22 x 33—7000 CFM, 250 H.P. synchronous motors 3/60/2300 V Belts.
1—Sutorbilt Gas Comp. 8 x 6.5—10 H.P. motor 3/60/440.
10—Fuller C-300 Compressor 1600 CFM @ 35#, direct connected 200 H.P. G.E. Motors 3/60/2300.
16—5 Ft. Fans 3 H.P. motors—20,000 CFM @ ⅜" SP.
4—Kinney Hi-Vac, 8 & 8 x 10—105 CFM.
1—I.R. Low Vacuum, Type 15—12 x 6, 250 CFM.
1—I.R. Low Vacuum, ER-1, 14 x 5, 15 H.P.
9—Stokes—Hi Vacuum Pump 212B—100 CFM.
5—Fuller V-300-200 Two Stage Vacuums, 3 direct connected 100 H.P. motors, 3/60/440.
Blowers from 560 to 12,000 CFM.

THE DARIAN CORP.
60 E. 42nd ST. N. Y. 17, N. Y.

FOR SALE

OVERHEAD ELECTRIC TRAVELING CRANES

Tons	Make	Span	Current
5	Northern	21'0"	230-VDC.
5	Northern	25'0"	230-VDC.
5	Milwaukee	50'0"	230-VDC.
10	Niles	37'9¾"	220-VAC.
10	Northern	37'10"	230-VDC.
5	Milwaukee	60'0"	220-VAC.
20/7½	Shaw-Box	90'0"	230-VDC.
25	Alliance	55'0"	230-VDC.

ELECTRIC MONORAIL HOISTS

QU.	TONS	MAKE	CURRENT
7	½	Lo-Hed & Shepard	230-VDC.
1	1	Shaw-Box	220-VAC.
1	2	Shepard	230-VDC.
1**	2	Shepard	220-VAC.
1*	2	Shepard	230-VDC.
3*	3	Lo-Hed	230-VDC.
1*	5	Lo-Hed	220-VAC.

*—2-Motor, Fl. Op. **—2-Motor, Cg. Op.
ALL ABOVE IN STOCK OFFERED REBUILT & GUARANTEED
SEND FOR OUR STOCK LIST OF A.C. & D.C. GENERAL PURPOSE CRANE & MILL MOTORS, ELECTRIC BRAKE & CONTROL EQUIPMENT, MOTOR GENERATOR SETS, TRANSFORMERS, ETC., OF ALL SIZES.

T. B. MACCABE COMPANY
4300 CLARISSA ST.
PHILADELPHIA (40), PENNA.

FOR SALE

CORE RODS

51000#—5/32" Rd. M.S.—14"
54000#—5/16" Rd. M.S.—14"

IRON & STEEL PRODUCTS, INC.
43 YEARS' EXPERIENCE

13444 S. BRAINARD AVE., CHICAGO 33, ILL.
"ANYTHING containing IRON or STEEL"

For Sale

OVERHEAD CRANES

1—6 ton Morgan, 46' span, cab operated, 230 V.D.C.
2—10 ton American Monorail, floor operated, 29' span, 2/60/220
1—25 ton Morgan, 60' span, cab operated, 230 V.D.C., with 50 KVA G.E. Generator
1—40 ton Browning, 70' span, 4 motor 230 V.D.C.

IRON & STEEL PRODUCTS, INC.
13444 S. BRAINARD AVE., CHICAGO 33, ILL.

TURBO BLOWERS

2100 cfm @ 10 oz. Spencer, with 10 HP, 220/440 V, 3/60/3600 RPM motor.
(4) 675 cfm @ 6 oz., Spencer, driven by 2 HP, 220/440 V., 3 ph. 60 cycle 3600 RPM.

PRESSURE BLOWERS

1600 cfm @ 2 lb. General Electric with 20 HP, 3/60, 3600 RPM motor.
1400 cfm @ 8 oz. Robinson with 5 HP, 3/60, 3600 RPM motor.
1100 cfm @ 16 oz. Sturtevant
800 cfm @ 24 oz. American with 10 HP, 3/60, 3600 RPM motor
500 cfm @ 14 oz. McKee, with 5 HP, 3/60, 3600 RPM motor.

HOISTS

¼ Ton—Detroit Titan—440/3/60
¼ Ton—Budget—220/3/60
¼ Ton—Comet—440/3/60
¼ Ton— Shepard—220 D.C.
½ Ton—Chisholm Moore—440/3/60
½ Ton—Cleveland—440/3/60

THE MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVENUE
CLEVELAND 14, OHIO

FOR SALE

1 Fisher tilting type furnace for #175 crucible, complete with blower and oil pump. Used 8 months, $675.00.
1 Pit furnace for #70 crucible. $100.00.
100 12-18 B.S.&B. 3" cope and 3" drag steel flasks. Practically new. $5.75 per set.
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1 Racine power hacksaw 6x6 capacity, complete with 1 HP motor and coolant pump. Nearly new. $185.00.
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2 2 HP Pedestal type U.S. grinders (double end). Nearly new. $130.00 each.
1 3 HP Pedestal type U.S. grinder (double end). Nearly new. $175.00.
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1—Tabor Plain Squeeze, Strain Rod Type
3—Mumford 3" Cyl. Core Jolt, with 20" x 15" Table

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6—#805 General Blowers, 5 HP, 3/60/220, 1400 CFM at 8-oz. pressure
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Maxon-Premix Blowers for Gas, ⅛ to 1 H.P.

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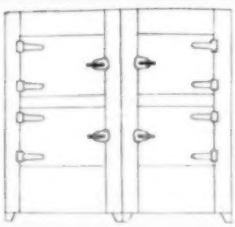

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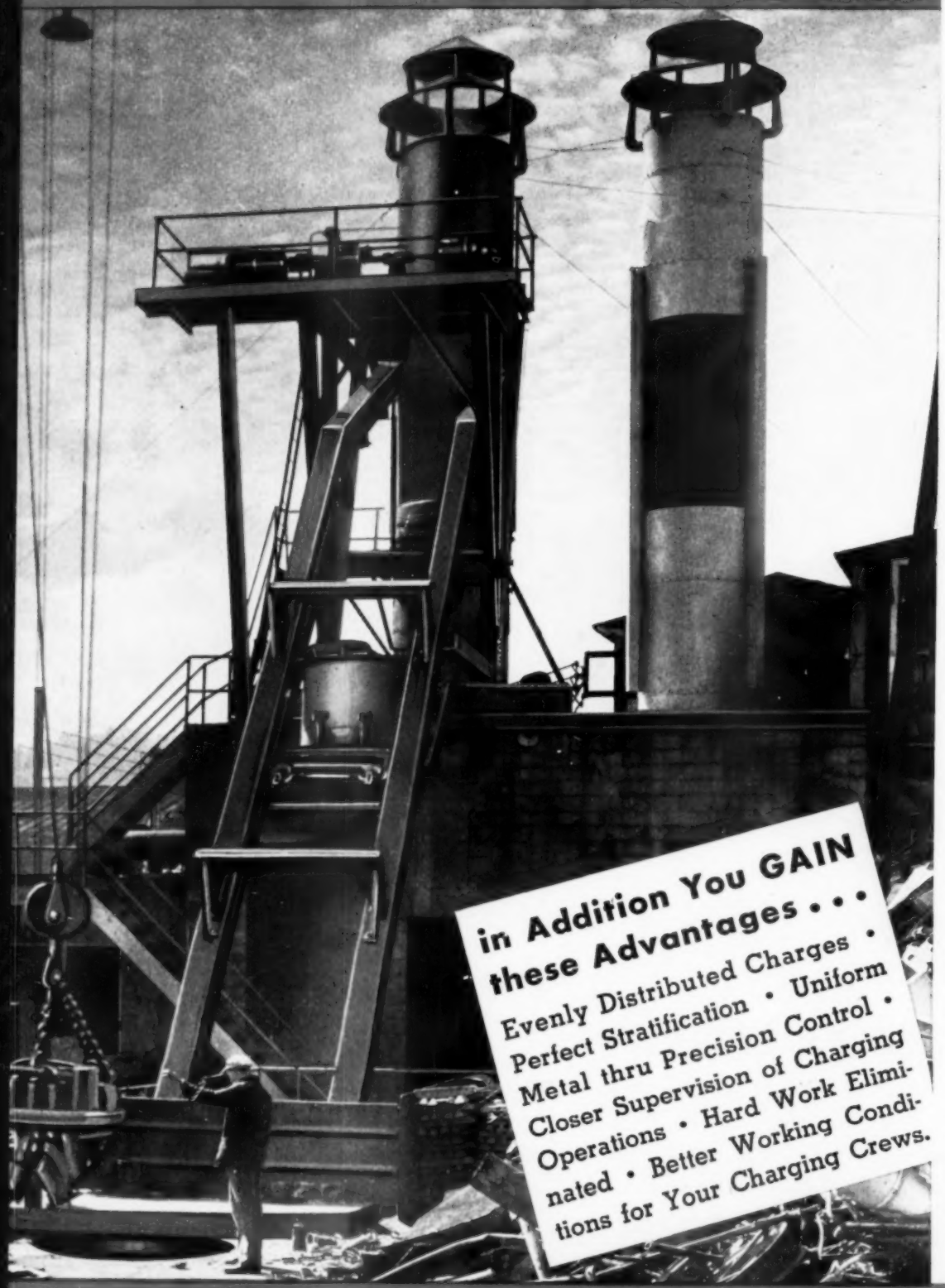

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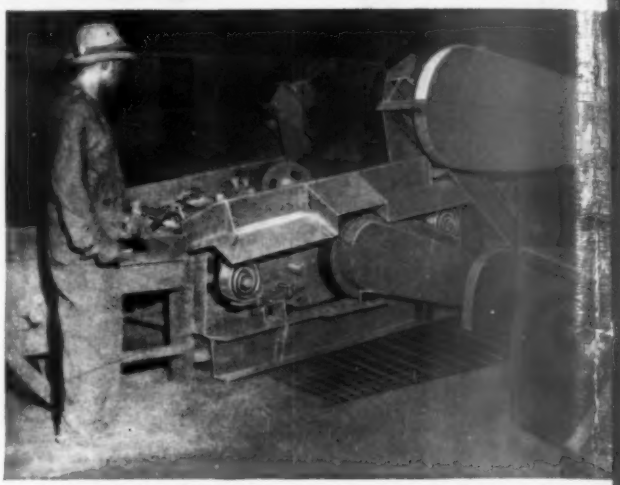
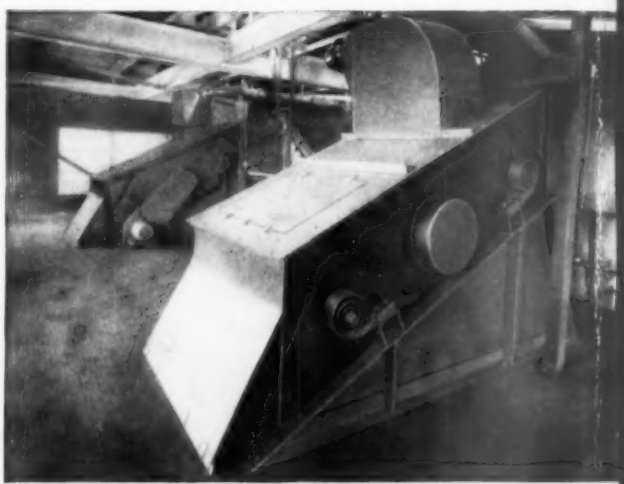


4 ft. x 6 ft. "CA" shakeout screen separating sand from castings in gray iron foundry.



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"CA" shakeout screen for castings in gray iron foundry.

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